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November 1988

Manned Systems Group
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Research Product 88-24

**Implementing Embedded Training (ET):
Volume 8 of 10:
Incorporating ET Into Unit Training**

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FOREWORD

This document is the eighth in a series produced by the Army Research Institute for the Behavioral and Social Sciences (ARI) and the Project Manager Training Devices (PM TRADE). The series consists of 10 related documents that present guidance for combat and training systems developers, including Army Materiel Command (AMC) laboratories, Training and Doctrine Command (TRADOC) Combat Developers and Training Developers, and contractor organizations involved in system development or developing technological thrust areas under Independent Research and Development (IR&D) programs.

This series of documents includes guidelines and procedures that support the effective consideration, definition, development, and integration of embedded training (ET) capabilities for existing and developmental systems. The 10 documents share the general title of Implementing Embedded Training (ET), with specific, descriptive subtitles for each document. They are as follows:

1. Volume 1: Overview presents an overall view of the guidance documents and their contents, purposes, and applications, including a discussion of the following:
 - a. what the total training system concept, including Embedded Training, is;
 - b. how training systems must develop within more general processes of materiel system development;
 - c. how embedded training must affect this relationship; and
 - d. what the content and uses of the remaining documents in the series are, as well as their relationships to the training systems development and acquisition processes, and how to use them.
2. Volume 2: ET as a System Alternative provides guidelines for the initial decision on whether ET should be further considered as a training system alternative for a given materiel system. It also includes guidance on considering ET as an alternative for systems under product improvement or modification, after fielding.
3. Volume 3: The Role of ET in the Training System Concept contains guidance for the early estimation of training system requirements and the potential allocation of such requirements to ET.
4. Volume 4: Identifying ET Requirements presents procedures for defining ET requirements (ETRs) at both initial levels (i.e., before initiating system development) and for revising and updating initial ETRs during system design and development.

5. Volume 5: Designing the ET Component contains analytic procedures and guidance for designing an ET component concept for a materiel system, based on specified ETRs.
6. Volume 6: Integrating ET with the Prime System discusses considerations, guidance, and "lessons learned" about factors that influence the effective integration of ET into materiel systems.
7. Volume 7: ET Test and Evaluation presents guidance for defining the aspects of the ET component (test issues) to be addressed in prototype and full-scale system testing.
8. Volume 8: Incorporating ET into Unit Training gives guidance for integrating ET considerations and information into unit training documentation and practice.
9. Volume 9: Logistics Implications presents helpful information on key logistics issues that should be addressed in the context of ET integration with prime item systems.
10. Volume 10: Integrating ET into Acquisition Documentation discusses developing the necessary documentation for, and specification of, an ET Component of a prime item during the Army's systems development and acquisition process. This document examines the Life Cycle System Management Model (LCSMM) and the Army Streamlined Acquisition Process (ASAP) and describes where and how to include ET considerations in the associated documentation. It also describes how to use the other volumes in the ET Guidelines series to generate the information required for the acquisition documentation, and provides guidance in preparing a contract Statement of Work for an ET Component to a prime item system.

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IMPLEMENTING EMBEDDED TRAINING (ET): VOLUME 8 OF 10:
INCORPORATING ET INTO UNIT TRAINING

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IMPLEMENTING EMBEDDED TRAINING (ET):
VOLUME 8 of 10:
INCORPORATING ET INTO UNIT TRAINING

INTRODUCTION

This volume provides generic guidelines for the integration of Embedded Training (ET) into training documents used by commanders and trainers at the unit level to develop and provide individual and collective training. How a unit commander, trainer, or direct supervisor can use the Embedded Training Component (ETC) for individual or collective sustainment training is a function of the instructional design of the ETC's training software and the instructions contained in:

1. Individual Training and Evaluation Program (ITEP) and Army Training and Evaluation Program (ARTEP) training documents; and
2. The ETC Operator's Manual.

Incorporating the ETC into the unit training program must be accomplished by integrating information on how to use the ETC into ITEP and ARTEP documents, and by providing an ETC Operator's Manual. These two topics are the focus of this volume.

The Army Training System and Unit Training

The Army training system is large, complex, and multifaceted. Within the Army training system, Army unit training occurs within a framework that structures what, how, when, and where individual and collective training is conducted by all field Army organizations. The Army unit training structure consists primarily of the ITEP and the ARTEP, and their respective program training documents. ET must blend into the established Army training framework to assure utilization of the ET capabilities and to enhance the effectiveness of the overall training function.

Training document developers must fully understand the unit training structure before attempting to utilize the ET integration guidelines in this volume. Appendix A provides a tutorial on the Army Unit Training system for those readers requiring initial instruction or as a refresher. This Appendix should be read carefully by the novice training document developer before attempting to apply these guidelines. The more experienced training document developer may desire to review Appendix A as a refresher.

GUIDELINES FOR THE DEVELOPMENT OF UNIT TRAINING DOCUMENTS FOR SYSTEMS WITH EMBEDDED TRAINING

Specific instructions for development of ITEP training documents are published in U.S. Army Training and Doctrine Command (TRADOC) Regulation 351-11, Soldiers training publications (STP), Policy and procedures (TRADOC, 1986b). TRADOC regulation 310-2, Military publications, Design, development, preparation and management of ARTEP documents (Mission training plans and drill books) (TRADOC, 1986a), contains similar instructions for ARTEP guidance documents. These regulations specifically address the development of individual and collective unit training documents in a traditional training, non-ET, environment. They do not include consideration of embedded training, since this training alternative has not been generally available. The guidelines presented here are intended to assist training developers in incorporating ET considerations into unit training documents.

The guidelines for the integration of ET into ITEP and ARTEP documents and the development of the ETC operator's manual were largely developed in the course of defining and developing unit training documents to support training with the ETC for the Fiber Optic Guided Missile (FOG-M) weapon system. The unit training documents were developed both to serve the FOG-M system and as a vehicle for determining what needed to be developed and how best to go about that development. The development process followed in the FOG-M project has been abstracted as the guidance in this volume. This guidance is intended to assist the training developer in incorporating ET into the unit training documents required for a specific system.

The developed FOG-M ETC Operator's Manual is presented in Appendix B, to serve as an example of suggested format and organization for such a document. Formats for ITEP and ARTEP training guidance documents are presented in TR 351-11 and TR 310-2, respectively.

When to Begin the ET Integration Process

The ideal time to begin the process of integrating ET into unit training guidance is when the operational system has reached Milestone II (that is, entered the Full Scale Development phase of the Life Cycle Systems Management Model [LCSMM] or the Development and Production Proveout phase of the Army Streamlined Acquisition Process [ASAP]). Milestone II is considered to be the earliest starting point for integrating ET into unit training documents, because at this stage (and not before), the system design is unlikely to undergo further major changes. At this point, system design has been firmed up, significant user and technical testing has taken place, and no additional major

changes to the system, requiring major ET changes, are anticipated. It is also at this point that the required inputs to the process of ET integration (final training analyses, ET design and functionality, etc., as described below) will be reasonably complete.

Required Inputs to the ET-Unit Training Documents Integration Process

The items listed below are required inputs to the process of integrating ET into unit training documents. The information referenced must be complete in order to provide sufficient data to begin the ET integration process. The process of integrating ET into unit training documents can begin before these products are available in final form, but this may result in unneeded expenditure of resources in later refining the interim document products. The required inputs are:

1. Draft tactical doctrine literature (Field Manuals and Field Circulars) and draft ITEP and ARTEP training documents (Trainer's Guide, Soldier's Manual, Drill Books and Mission Training Plans) will have been developed or modified as an earlier requirement in the Logistic Support Analysis (LSA) process during the acquisition process. There will be differences in the completeness of these draft materials between newly created Career Management Fields (CMF) and Military Occupational Specialties (MOS), and existing CMFs and MOS. New CMFs or MOS may require the development of completely new ITEP and ARTEP documents. Existing CMFs or MOS (modified to accommodate new systems) will typically require modifications to existing ITEP and ARTEP documents, to include both new and modified tasks and references to the ETC. Requirements for development of documents specific to the ETC, however, do not differ between the two situations.
2. Training analyses should be completed, including a late iteration of Embedded Training Requirements (ETR) identification, to specify the tasks to be included in the ET component of the training system.
3. The final iteration (or a late developmental iteration) of ET design should be complete. The ET design process must parallel the total system engineering design, and both overall system design and ET design must be fairly firm, including full definitions of the soldier-machine interface(s). The ET design concept is highly (and inter-actively) dependent on system requirements and related soldier task characteristics. The adequacy of ET coverage of system tasks will be partly a function of the extent to which ET requirements are considered in the overall system engineering design process. Major changes to the system

design, and occasionally even minor changes, can have a significant impact upon the ET design concept and the resulting capabilities of the ETC.

4. Embedded training courseware outlines must be completed. These must provide sufficient detail so that process information (input, processing, output) can be critically examined. This is necessary to develop a thorough training design overview, as well as complete and accurate written instructions for use of the ETC as a tool for both training and evaluation.

Overview

The following subsections discuss three essential components of integrating ET into unit training documentation. The first subsection deals with the development of an ET Component Operator's Manual. This discussion describes the suggested content and organization of such a manual. This information will primarily be useful to contractor personnel who develop the ET component and its associated documentation. The following two subsections deal with integrating ET considerations into ITEP and ARTEP training guidance documents, respectively. This information will be useful to the developers of these publications, normally personnel in the TRADOC schools. In the interest of efficiency, it is recommended that the ETC Operator's Manual be developed first, to provide input into preparation of ITEP and ARTEP documents.

Embedded Training Component (ETC) Operator's Manual

An ETC Operator's Manual will be a necessary addition to the publications for those systems with an ETC. Presently neither TR 310-2 nor TR 351-11 mention such a document. If the ETC is totally embedded in the system, the ETC Operator's Manual should be integrated into the System Operator's Manual (typically the -10 series Technical Manual [TM] for the system). This would increase the probability that ET guidance and instructions would be available to the trainer or operator. If ET is a strap-on component, the ETC Operator's Manual should be produced as a separate document that would accompany the strap-on ETC. Providing the ETC Operator's Manual in this fashion can increase the likelihood that ETC training guidance will be available with the training component of the system.

Generic Development Guidelines. The ETC Operator's Manual provides general guidance and specific training instructions for use of the ETC in individual and collective task training. This document must follow the structure detailed in MIL-M-63036 (Technical Manual).

This document provides an ETC description, detailed instructions on ETC operation and maintenance, and ETC-specific training instructions. The ETC-specific training instructions provide an overview of each ETC lesson, and a detailed breakout of learning objectives, tasks, conditions, skills (including prerequisites), and performance standards covered by that lesson.

Conduct of Individual Training. General training guidance should cover topics such as initial operating instructions, conduct of individual training, and conduct of collective training using the ETC. The latter two topics should follow the outline of the Army "Five P" model of training management found in FM 25-3 (DA, 1984c; the "Five P" model is also summarized in Appendix A of this report).

Conduct of Collective Training. The ETC Operator's Manual is envisioned as an ITEP guide that also provides general guidance on use of the ET Component for collective training. ARTEP documents would contain more detailed collective training instructions. The concept of general guidance in use of the ETC includes information about the conduct of collective training exercises (Battle Drills, Situational Training Exercises [STX], and Field Training Exercises [FTX]) utilizing the ETC. This might be illustrated in the ETC Operator's Manual by including a sample Battle Drill, STX, or FTX, complete with operational order (as required), and a narrative description demonstrating use of the ETC in the scenario.

When to Choose ET as a Training Alternative and How to use ET for Effective Training. The ETC Operator's Manual should provide comprehensive guidance on when to select ET as a training resource, as well as guidance for effective utilization of ET. The ETC courseware outlines (contained in the ET Design Concept document developed by applying procedures in Volume 5 of this series) should drive preparation of the ETC Operator's Manual training instructions and suggestions. These training instructions and suggestions should be structured according to the courseware outline lessons, tasks, and learning objectives addressed by the ETC. The Embedded Training Requirements (ETR) document (developed by applying guidance in Volume 4 of this series) provides a listing of all system tasks to be trained via ET. This can be used as an organizing guide to cross-referencing tasks included in the ETC. Doctrinal literature (e.g., FMs, FCs) provides the detailed conditions and situations under which the system is required to operate. These publications may provide suggestions or ideas concerning the situations or scenarios in which using ET is most effective. Obviously, only those tasks capable of being trained on the ETC should be included in decision and utilization guidance.

Each ETC is system specific. Therefore, a thorough examination of the ET courseware must be conducted to understand the structure and organization of the training system. Construction of a matrix relating lessons, tasks, and learning objective content to instructional characteristics, as shown in Table 1, is an aid to understanding ETC content. Some lessons, or instructional segments, may be passive, while others

will require frequent student interaction. This interaction will have differing input, processing, and output characteristics from lesson to lesson and scenario to scenario. According to the instructional design, feedback will be immediate or deferred, and performance criteria or standards will differ within and between tasks. Use of a matrix like the example in Table 1 will assist the training developer to obtain a detailed understanding of the ETC instructional design. Once this understanding is complete, development of the ETC Operator's Manual can proceed.

Table 1

ETC Lesson to Characteristics Matrix

		LESSON CHARACTERISTICS						
LESSON	TITLE	LVD	IVD	CGI	IFB	ELFB	AR	%

(entries)

KEY: (Sample only)

LVD - Linear Videodisc
 IVD - Interactive Videodisc
 CGI - Interactive Computer Generated Imagery
 IFB - Immediate Feedback
 ELFB - End-of-Lesson Feedback
 AR - Automatic Remediation
 % - Programmed Sustainment Training Standard

ETC-specific training instructions should be structured according to the task, lesson, or learning objective under consideration. Training instructions should contain topic-specific instructions and training suggestions, to include recommended remediation approaches or media for specific training problems. The concept of using ETC lesson part-task training capabilities (if included) for evaluation, training, re-evaluation, and remediation, should be introduced, as it is in this area that alternative training media may be most applicable. Many part-tasks contained in a typical ETC will have prerequisites that can better be trained using non-ET media, if the prerequisites are not already mastered. Specific suggestions for remediation via alternative media should be provided to users, to give the capability to overcome training deficiencies that the ETC is not designed to deal with.

Training instructions should be written so that the soldier can select lessons and utilize the ETC in an individual, self-paced, instructor-independent learning mode. The training developer should not assume that a trainer or instructor will be available to assist the individual in all ETC learning or practice experiences, since the reality of unit training often dictates otherwise.

Using ET as a Collective Training Resource. When the capability exists to "network" the ET components of similar or different system types for collective training, detailed instructions should be provided in the ETC Operator's Manual to support this use. The exercises or training tasks and scenarios that are supported by this capability should be listed. Instructions should be provided for interconnecting the ET components of systems, as applicable. Instructions should also be provided to activate the connected ET components in a coordinated, interactive fashion. Suggestions should be provided for the use of "networked" ET components, including the selection of scenarios and exercises, and how to identify the various ET components with scenario or exercise roles or "players."

This portion of the ETC Operator's Manual should be presented as a separate section dealing with collective training employment of the ETC. Also included here should be instructions and suggestions for interfacing the ETC with other add-on training support tools, such as the Multiple Integrated Laser Engagement System (MILES), as applicable.

Training Evaluation. General information should be provided about the potential use of the ETC as a part or whole task evaluation tool for individual and, possibly, collective training. The capabilities of the ETC for external and internal evaluation should be addressed within the frameworks of both the individual and collective training functions. An ETC will seldom, if ever, be capable of providing total mission evaluation. It may, however, provide a real capability for partial mission evaluation in the collective training context, as well as task evaluation for individual training. The potential for ETC evaluation of collective tasks should be addressed, and references made to the appropriate Battle Drills and Mission Training Plans containing specific ETC collective task and mission evaluation capabilities.

An example ETC Operator's Manual is contained in Appendix B.

Integrating ET into ITEP Documents

TRADOC regulation 351-11, Soldiers training publications (STP), Policy and procedures (TRADOC, 1986b), provides specific guidance and instructions for development of ITEP training documents (Trainer's Guide and Soldier's Manual). This regulation does not address the need for these documents to support embedded training, since ET has not usually been an available option for unit training.

The ET integration guidelines in this volume augment the policy and procedures provided by TR 351-11, by addressing training document development issues required by the introduction of a system with ET.

Regardless of whether new training documents are created or existing documents are modified, the training document developer will be faced with the same challenges. Once the basic draft training documents have been developed, following TR 351-11, the questions of where and how ET-specific issues are to be addressed must be answered.

Table 2 outlines the answers to these questions within the identified ITEP document framework.

Trainer's Guide. The Trainer's Guide (TG) is an MOS-specific training reference document that describes the required CMF and MOS individual critical tasks and available task training materials for training individuals and small groups.

Generic Integration Guidelines. Development of this document should take place after the development of the ETC Operator's Manual. The ETC Operator's Manual provides the structure and instructional content of the ET courseware, which must be known before its contents can be integrated into an existing or new TG. The ETC Operator's Manual also provides specific information on the procedures needed to activate and deactivate the ETC, as well as procedures for selecting lessons or scenarios, training management, and so forth.

Conduct of Individual Training. The present TG contains a general information paragraph entitled "Training Literature, Aids and Devices." This paragraph should be expanded to include mention of the purpose and capabilities of the ETC available on the system. The TG also contains a critical task listing entitled "MOS Training Plan," which should be cross-referenced to identify tasks or procedures that are included in ET.

Task Conditions, Standards, Performance Measures, and How-To Instructions. Specific lesson references and guidance on the appropriateness of the ETC as a training alternative should be included for each specific task for which ET is provided. Such references and guidance need not be elaborate or duplicate information available in other training material. However, references must be specific enough so that the soldier or trainer can readily identify whether ET is appropriate for a particular soldier's skill level, and easily identify the ET task reference. Alternative training resources must be identified for all tasks, since ET will rarely be the only available training medium. A task to training resource alternative matrix, such as the sample shown in Table 3, can be used as a means to identify, evaluate, and select from the alternatives.

Table 2

ITEP Document Elements Requiring ET Guidance Integration

	Trainer's Guide	Soldier's Manual	ETC Operator's Manual
General Elements			
Conduct of Individual Training	a		c
Conduct of Collective Training			c
Specific Elements			
Task Conditions, Standards, Performance Measures, and How To Instructions	b	c	
Training Material Reference List	a	a	
Suggested Sustainment Training Frequency	b		
When to Choose ET as a Training Alternative			b
How to use ET for Effective Training			c

KEY:

- a. ET referenced as a training alternative.
- b. ET indicated as the most training effective choice for a given task.
- c. Location of specific ET guidance and instructions.

Table 3

Potential Training Alternatives

TASK NUMBER	TASK TITLE	POTENTIAL TRAINING ALTERNATIVES						
		ET	TM	FM	VT	LEC	TA	TD

(entries)

POTENTIAL TRAINING ALTERNATIVE KEY:

ET - Embedded Training
TM - Technical Manual (Operator/Maintenance Manual)
FM - Field Manual (Tactical employment guidance)
VT - Videotape/film
LEC - Individual or small group instruction
TA - Training Aid
TD - Training Device or Simulator

Training Material Reference List. ET and other training alternatives for a given task should be listed in the References column of the Critical Task List in the MOS Training Plan of the TG. This identifies ET in context among all the training resource alternatives (e.g., TEC Lessons, FMs, TMs, video media, etc.) as an individual task training resource associated with each task it is intended to train. Specific ET references should also be listed in the consolidated training reference appendix of the TG.

Suggested Sustainment Training Frequency. The TG contains a suggested task training frequency index for each critical task. At present, the indicated training frequency ranges from a low of annually to a high of monthly. With ET capabilities available as a sustainment training resource, training frequencies may be different from those for other media and may ultimately be on an "as-feasible" daily, weekly, or bi-weekly frequency. When this is the case, these frequencies should be referenced in the sustainment task training frequency index, as appropriate.

Soldier's Manual. The Soldier's Manual (SM) is a personal training and performance guide for CMF and MOS critical tasks for the individual soldier. Each critical task is listed with conditions, standards, performance measures, how-to instructions, and training references.

Training Material Reference List. Some SM task performance instructions contain specific training material references within the narrative text. Others have these references only in the end-of-task training material listing. The consolidated training material reference listing (consolidated over tasks) should include a listing of ET training references.

Integrating ET into ARTEP Documents

TRADOC regulation 310-2, Military publications, Design, development and management of ARTEP documents (Mission training plans and Drill Books) (TRADOC, 1986a), provides specific guidance and instructions for development of non-ET Army Training and Evaluation Program (ARTEP) documents. The ET integration process in this volume supplements TR 310-2 procedures. This guidance only addresses those areas of ARTEP document development that are impacted by the introduction of ET.

Whether new training documents are to be created or existing documents modified, or even which agency is tasked with document development responsibilities, the training document developer will be faced with the same challenges. In developing ARTEP training documents, following TR 310-2, how and where are ET-specific issues to be addressed? Table 4 summarizes the answers to this question.

Battle Drills

The lowest level ARTEP training document in the collective training process at unit level presents training guidance for the conduct of Battle Drills. This document is referred to as a Drill Book. It outlines training to support the integration of individual tasks into collective mission task performance at the lowest organizational level (section, squad, and platoon). Battle Drills specify cues, standards, performance measures, supporting individual tasks, and instructional techniques for critical mission tasks.

Generic Integration Guidelines

Training evaluation. The evaluation methodology for Battle Drills, as presently prescribed by TR 310-2, pertains primarily to visual observation of some actions and performance measurement by standard or results. This section should be written to include use of

the ETC performance measurement capability as a Battle Drill evaluation tool, using detailed ET performance standards information.

Table 4

ARTEP Document Elements Requiring ET Integration

	Battle Drills	ARTEP MTP	ETC Operator's Manual
General Elements			
Training Principles			a
Training Evaluation	c	c	c
Specific Elements			
Task Cues, Standards, Performance Measures, and How-to Instructions	a,b	a,b	
Training Material Reference List		a	
Situational Training Exercises (STX)		b	
Field Training Exercises (FTX)		b	b
Training Evaluation Procedures		c	c

KEY:

- a. Where ET is indicated as the most effective choice for collective training.
- b. How ET is utilized to provide training.
- c. How ET is utilized to provide evaluation.

Task cues, standards, performance measures, and how-to instructions. All Battle Drills identify the initiating cues for performing the Battle Drill, specify performance standards and performance measures, and describe how the Battle Drill is to be performed. In addition, instructions for setting up and conducting specific Battle Drills may be provided, if necessary.

Guidance for selection of the ETC as a training alternative for a given Battle Drill (if applicable) should be included in the section dealing with instructions for Battle Drill conduct, in sufficient detail to insure that the trainer knows which ETC lesson(s) support particular Battle Drills.

Another important section is the performance measures description. The Battle Drill-specific ETC performance measures and evaluation procedures should be explained in this section.

The applicability of ET to specific Battle Drills for training or evaluation purposes will depend on specific ETC capabilities. Therefore, an example Drill Book or Battle Drill was not developed.

ARTEP Mission Training Plans (MTPs)

The second document that guides collective training program at the unit level is the ARTEP Mission Training Plan (MTP). MTPs are intended to provide platoon, company, and battalion levels with specific guidance for the conduct of larger unit collective training.

Generic Integration Guidelines

Task conditions, standards, performance measures, and how-to instructions. Collective training tasks prescribed for the various unit levels within an MPT include Situational Training Exercises (STX), Field Training Exercises (FTX), and Command Post Exercises (CPX), in addition to other types of exercises. The STX and FTX, in particular, are hierarchially related to the Battle Drills described in Drill Books. That is, Battle Drills are components of various STXs, and STXs can be grouped to define FTXs at various levels. All of these types of exercises are supported by various individual tasks. Cross-referencing is provided in MTPs between supporting individual tasks and the various types of Battle Drills and exercises, by Training Matrixes.

Tasks capable of being supported by an ETC for a system should be identified in the MTP, to enable selection of ET as a training medium when appropriate. There will sometimes be the potential to "network" ET components across systems of the same (e.g., the five tanks in a platoon) or different (Missile Minder linked with Hawk or Patriot batteries) system types, to provide collective training. When this capability has been included as a component of the ETC for a particular system, it should be specifically mentioned in the MTPs for units using each system type, and each task for which this capability is provided should be identified. When "networked" ET for collective training is possible, reference to procedures for preparing and connecting ET components for collective training using this capability (contained in the ETC Operator's Manual) should be made in the MTP.

Training exercises. This section provides specific guidance for conducting STX and FTX (as well as possibly other types of exercises) at a given organizational level (platoon, company, or battalion). The availability of ET component support for various exercises should be mentioned as appropriate in the exercises provided. The availability and use of the ETC should be mentioned in the section on Support Requirements. If a "networked" ET capability is provided, this should be mentioned as an alternative to Local Training Area (LTA) or maneuver area STXs and FTXs, if appropriate. The exercises for which "networked" ET is provided should be explicitly called out. If a collective performance measurement capability is provided by the ETC, its performance measurement characteristics should be related to the Training and Evaluation Outlines (T&EO) for each appropriate exercise, and the relationships between T&EO and ETC performance measures specified.

External evaluation procedures. These procedures provide the specific external evaluation guidelines to assess the ability of a unit to effectively conduct its assigned combat missions. It contains specific information about preparing, conducting, and managing the test. This guidance may be found in Chapter 6 of an MTP.

Integration of ETC specific information into this section should follow the following guidelines.

General and specific guidance and instructions for use of the ETC in the conduct of unit tests should be included in the test scenario development, exercise control procedures and evaluator training procedures. A thorough understanding of the ETC's functional evaluation capabilities, gained from the ETC Operator's Manual, is necessary to integrate ETC considerations here.

The applicability of ET to specific missions, STXs, and FTXs for training and evaluation will be highly specific to the capabilities of a specific ETC, so an example MTP containing ET guidance was not developed.

References. Each MTP provides a section for referencing associated documentation and guidance. The ETC Operator's Manual, and any Drill Books that reference ET-supported training should be listed here to provide a ready reference to materials to support ET use.

Product Validation and P³I

Product Validation

When the initial process of integrating ET considerations into ITEP and ARTEP documents is complete, document products should be validated by both the unit trainer and trainee population representa-

tives. If completed in time, these unit training products should be validated during system training for User Tests (UT). If not completed in time, such products should be validated by Subject Matter Expert (SME) review and institutional testing before being fielded. Validation requires that, as a minimum, one complete operational system, with embedded training, be available.

Once validation has taken place, the unit training program documents should be updated to remedy any deficiencies discovered during validation. Occasionally, improvements in ET software may be recommended, based on the unit training document validation process. If these recommendations are incorporated into the ET software, appropriate modifications to the unit training documents must be made. Once all revisions are incorporated into these documents, another validation may be required.

Pre-Planned Product Improvements (P³I)

Pre-planned product improvements do not always relate solely to hardware improvements. With the increase of computerized weapon and information management systems in the Army inventory, frequent improvements of operational software are becoming the norm rather than the exception. Some of these improvements are extensive enough to be considered P³I, while others are minor and are only considered to be program modifications. Several systems presently in the acquisition process are intended to be introduced into the inventory as P³I systems, with incremental capability expansions over a period of time.

The P³I process poses a different set of issues for unit training document developers than a system that does not incorporate P³I. Each P³I of the operational software will require a concurrent P³I of the supporting ET component and other training system components, including unit training documents. It is imperative that the P³I ETC and supporting unit training documents be released concurrent with the P³I operational software. Past delays between release of an operational system and its supporting training system have caused poor initial unit readiness and training system credibility problems. It is essential that supporting training elements (ET, training devices, and literature) be fielded not only with the system initial issue, but with P³I improvements, as well.

Even minor modifications to the operational system software or hardware may have a significant impact on the instructional content of the ETC. Changes to the operational system that are transparent to the operator or maintainer are probably not significant for training purposes. Changes that are visible to the user will require modification to the ETC and supporting unit training documents. Therefore, training developers must always be cognizant of operational system modifications and their impact for the system user. Individually, minor software or hardware changes may not be significant. However, the cumulative effect of multiple changes may be very significant, in

terms of training compatibility with operational system capabilities. Training must be kept current with the configuration and capabilities of the operational equipment, to maintain training capability and credibility.

When preparing unit training documents for the initial issue version of a P³I system, the training developer must be aware of the proposed functional capabilities of later P³I versions of the system. Tasks and training objectives will likely be expanded or modified in later P³I versions, rather than introducing entirely new tasks and training objectives. This issue must be considered when developing training for the initial version of the system. For example, an initial version of a weapon system may only allow a gunner to track two targets at once, but later versions will allow the operator to track five targets simultaneously. If the system soldier-machine interface (SMI) allows training for tracking five targets, even if the operational software and hardware only allow tracking two targets at initial fielding, the operator can be trained to track the larger number (assuming this will not impact performance with the smaller number of targets). This may enhance gunner performance at the lower level of system capability, while simultaneously training the gunner to take advantage of the later (P³I) capability.

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APPENDIX A

A TUTORIAL ON THE ARMY TRAINING SYSTEM AND THE UNIT TRAINING MODEL

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INTRODUCTION

This appendix is provided as a tutorial for those readers who are unfamiliar with the Army Training System or the Army Unit Training Model. This appendix does not replace the documents from which this information was gathered. It is merely a concise collection of information about the Army Training System in general and the Army Unit Training Model in particular. A thorough understanding of the system and model is necessary to the understanding and implementation of the Embedded Training unit training integration guidelines. For those readers already familiar with the Army training process and the training documents available for individual and collective training at unit level, a brief review of the Army Unit Training Model, beginning on page A-9, should be sufficient.

THE ARMY TRAINING SYSTEM

The Army's training system provides training for all levels and types of soldiers. Its coverage ranges from Junior Reserve Officer Training Corps (JROTC) programs in many of the nation's high schools, through Basic Combat Training (BCT) and Advanced Individual Training (AIT), to Command and General Staff College (C&GSC) level for future commanders at Fort Leavenworth and the Army War College at Carlisle Barracks, Pennsylvania, for potential general officers.

Training of soldiers is a compound responsibility of several major commands. The U.S. Army Training and Doctrine Command (TRADOC) is responsible for all institutional training for Regular Army and Reserve Components, and is also responsible for exported training (e.g., the Army Correspondence Course Program [ACCP] and Training Extension Course [TEC] Program). The U.S. Army Forces Command (FORSCOM) is responsible for all unit training, and for training of individuals in units. The training for forces in Europe and Korea is the responsibility of the local Major Commands (MACOM).

TRADOC operates the training base of institutional training centers and specialty training schools--the TRADOC schools, which train soldiers in their military specialties (e.g., U.S. Army Infantry School, U.S. Army Quartermaster School, U.S. Army Intelligence School and the U.S. Army Transportation School). The TRADOC schools provide individual initial entry and advanced specialty training, and also develop and disseminate training materials and materials on operational and tactical doctrine in their specialty areas. Training development is to be governed by, and conducted in accordance with, TRADOC Regulation (TR) 350-7 (TRADOC, 1982). TRADOC provides developed training materials and guidance to the U.S. Forces Command (FORSCOM) for use in unit training, which is a FORSCOM responsibility.

The U.S. Army Training Board (USATB) and the U.S. Army Training Support Center (USATSC) actually formulate, design, develop, and provide much of the training guidance to FORSCOM and to all active duty, reserve and National Guard (NG) components of the U.S. Army. USATSC, in particular, manages the production and dissemination of training materials that apply to all Army components (e.g., Training Extension Course [TEC] materials for individual training and the Field Manual [FM] 25-1 through 25-5 series covering unit training).

The Army training system basically provides two types of training (individual and collective) at each of two levels (institutional and unit), although variations may be seen in special cases.

Individual training pertains to individual soldier mission essential tasks. It is characterized by three functions: (1) initial training (learn the task); (2) proficiency training (train to standard); and, (3) sustainment training (train on a continuing basis, with realism, to maintain proficiency) (DA, 1984c). Most critical individual initial and proficiency training for new and advanced skills qualification is conducted at the institutional level. Sustainment training of mission essential job skills is a unit responsibility. Skill sustainment training is the prime focus of individual training within units. This training concentrates on sustaining essential individual soldier task proficiency levels that pertain to their assigned unit missions.

Collective training, occurring primarily at the unit, can be described as training that builds individuals into a cohesive, cooperative team whose collective efforts will accomplish their unit's war-time mission (DA, 1984c). Team proficiency depends on the coordinated performance of collective and individual skills and tasks sustained at crew, squad, section, platoon, company, and battalion levels. Collective training is generally conducted only at the unit level; however, it may be conducted at the institutional level when totally new (as opposed to upgraded) weapons systems are being fielded (e.g., Patriot missile battalions which are organized, trained and certified operationally ready at the U.S. Army Air Defense Artillery School [USAADAS] prior to U.S. Army Europe [USAREUR] assignment).

Institutional training is conducted in various training centers and specialty schools operated by TRADOC and overseas MACOMs. Training centers are organized on the basis of One Station/Unit Training (OSUT) and Two Station/Unit Training (TWOSUT). OSUT centers provide basic combat training (BCT) and advanced individual training (AIT) for initial entry soldiers (e.g., the U.S. Army Infantry Training Center [USAITC] provides BCT and AIT for all infantry MOSs), thus the one station/unit training concept. TWOSUT centers provide only BCT and send initial entry soldiers to another station or unit for AIT. Army specialty schools are organized and equipped with the educational resources to provide both specialized AIT for initial entry soldiers and multilevel advanced specialty skill enhancement training and leadership training for more advanced soldiers.

Institutional training is characterized by organized, structured, formal initial (learn the task) and proficiency (train to standard) skill training techniques normally associated with "school house" environments. Most institutional training concentrates on individual skills and knowledges, although some institutional training does teach collective tasks and skills. Such collective training is most usually found in advanced institutional courses rather than in the initial entry courses (BCT and AIT).

Unit training is conducted in operational organizations, in tactical and garrison environments. Unit commanders are responsible

for the planning, preparation, presentation, practice, and performance of all training conducted in their units, regardless of the type of training required. Army units have specific military missions and must train to perform these missions in a variety of environments. Due to limitations on available training time, reserve and National Guard units have very different training needs than active duty Army units.

Unit training in field units is characterized by the continuation of individual training in the form of sustainment training (maintenance of proficiency through training with realism) and the blending of individual skills into a coordinated collective unit training effort under the most realistic wartime mission conditions possible.

These individual and collective training responsibilities are performed within the structure of a specific unit training model.

THE ARMY UNIT TRAINING MODEL

The Army unit training model prescribes the design and conduct of training for units of all Army components and organizational levels. Army unit training program guidance is defined and described in the following USATSC developed documents.

Field Manual 25-1, Training

This manual provides an introduction to the philosophy and principles of Army training, addressing these points in very general terms (DA, 1985b).

Field Manual 25-2, Unit Training Management

This manual provides doctrinal information and procedural guidance for managers of Army unit training at the company level and above. It deals primarily with the training management process, plus short and long range planning for the conduct of unit collective training at the levels of company and above. It contains numerous examples of the documents used in the training management/planning process (e.g., Unit Training Plan, Short Range Planning Calendar and Long Range Planning Calendar) (DA, 1984b).

Field Manual 25-3, Training in Units

FM 25-3 is written primarily for company level officers and NCOs, who have direct responsibility for the conduct of training. This manual provides the methods and guidance needed to conduct such training. It separates the unit training function into two programs--the Individual Training and Evaluation Program (ITEP) and the Army Training and Evaluation Program (ARTEP), which apply to individual and collective training tasks, respectively. Collective task training is stressed at the unit level. However, the manual describes a process whereby a collective task is broken down into its component individual tasks. These are then evaluated and individual training is conducted to overcome deficiencies noted in evaluation (DA, 1984c). The manual

also discusses and illustrates the "Five P" model of training management for unit trainers and is briefly described below.

The "Five P" Model of Training Management

Planning Phase. Planning consists of those steps involved in planning for the conduct of training. This includes command training guidance, backward planning and training and evaluation plans.

Preparing Phase. The preparing phase involves preparation of trainers to present (task reviews and training rehearsals) and soldiers to receive training (pretests, confidence and prerequisite training). It also involves preparation of training resources (equipment, facilities and materials).

Presenting Phase. The presenting phase examines training methods (demonstrations, conferences and lectures), instructional techniques (preparation, questions and demeanor) and materials (audiovisual equipment and materials, television trainers, sand tables, etc.)

Practicing Phase. The practicing phase is the actual hands-on, skill development aspect of training. This phase includes three stages of training practice; initial (learning the task), proficiency (training to standard), and sustainment training (training with realism).

Performing Phase. The performing phase is the formal evaluation of units and individuals against Army Training and Evaluation Program and Individual Training and Evaluation Program performance standards.

Field Manual 25-4, How to Conduct Training Exercises

This manual provides commanders, staff, and exercise planners with doctrine, guidance and examples for planning, conducting and controlling multilevel, combined arms training exercises. It begins with fundamental training theories and continues with discussions of determining training needs and how to plan for the conduct of appropriate unit training exercises. It concludes with sample scenarios for exercises (DA, 1984d).

Field Manual 25-5, Training for Mobilization and War

This manual is intended for use by commanders and staff within the training bases, major Army commands and units. It provides guidance

regarding training doctrine for all elements of the Army upon mobilization and war. It outlines the mobilization process, the training requirements for the total Army force facing mobilization, institutional and unit training and the training support that will be available (DA, 1985c).

INDIVIDUAL TRAINING AND EVALUATION PROGRAM (ITEP)

The Individual Training and Evaluation Program (ITEP) is applicable to individual sustainment training at the unit level. ITEP Soldier's Training Publications are produced to provide individual soldier and unit trainer guidance for this program (e.g., STP 7-11H-TG, Trainer's Guide, Heavy Anti-armor Weapons Infantryman, 19 July 1985 (DA, 1985d)). The ITEP documents, as listed in Table A-1, are prepared for every MOS in the Army, but not for all skill levels.

Table A-1

Individual Training and Evaluation Program (ITEP) Summary

Standards	Methods	Documents	Evaluation Criteria
Task competencies	Performance oriented training	Trainer's Guide Soldier's Manual	Skill Qualification Test (SQT) Common Task Test (CTT)

Source: DA, 1984c

Trainer's Guide

The Trainer's Guide (TG) provides the unit trainer with a narrative explanation of responsibilities for individual and collective task training and explains how to develop a meaningful training program. The TG also contains: a list of critical MOS tasks; training references that apply to each specific task; suggested sustainment training frequency; an indication of the location for initial training for that task; and, a cross-reference to ARTEP documents where that task is used. The Trainer's Guide is addressed to the NCO trainer or supervisor.

The Trainer's Guide contents consist of:

1. Purpose - This section specifies the purpose of the Trainer's Guide.
2. Enlisted Personnel Management System (EPMS) - This section outlines and explains the broad nature and purpose of the EPMS.
3. Explanation of the Army Training System - This section explains, in broad terms, the interrelationships between institutional and unit training.
4. Trainer's Responsibilities - This section provides an overview of the purpose of unit training and a general explanation of a commander's training responsibilities.
5. Conduct of Individual Training - This section provides guidance and suggestions on how to conduct individual training in a traditional (non-ET) environment. It outlines use of the standard Army training methodology of test, evaluate weaknesses, train to correct weaknesses and test again. No guidance is provided on how to train to correct specific weaknesses.
6. Conduct of Collective Training - This section describes the purpose of collective training, use of the ARTEP Drill Books and Mission Training Plans in conducting collective training and outlines the standard Army training methodology given for individual training.
7. MOS Task List - A listing of critical task titles required for all skill levels of that particular MOS. This includes common soldier, CMF specific, and system specific critical tasks.
8. Training Material Reference List - A listing of those training adjuncts available for that particular task (e.g., Training Extension Course [TEC] lessons, Field Manuals [FM], Technical Manuals [TM] and special training documents). Training aids and devices are not presently listed.
9. Training Frequency - A specific training frequency is suggested for sustainment training for each task title listed (e.g., Annual, Semiannual, Quarterly, Bimonthly, and Monthly).

10. Task to ARTEP Document Reference - For each critical task title listed, an ARTEP document reference is provided which contains a mission where that particular individual task is required.

Soldier's Manual

The Soldier's Manual (SM) provides a one-stop source for most of the basic knowledge required to perform all of a soldier's critical MOS tasks. The SM contains instructions for individual soldier use of the manual; an explanation of career progression under the Enlisted Personnel Management System (EPMS); critical task listings pertinent to their specific skill level; task summaries for each critical task with statements of condition, standards, performance measures with step-by-step performance procedures; study references; and duty position task summaries. The performance procedures are usually condensed versions of information available in cited references.

The content of a typical Soldier's Manual are:

1. Purpose - This section provides general information about the purpose of the Soldier's Manual.
2. Enlisted Personnel Management System - This section provides general information about the EPMS and the requirements, under EPMS, for promotion.
3. MOS Task List - A listing of critical task titles required for all skill levels of that particular MOS. This includes common soldier, CMF specific and system specific critical tasks.
4. Task Conditions, Standards, Performance Measures, and How-to Instructions - For each critical task listed in the SM, the following information is provided:
 - a. Task conditions - A narrative description of the conditions under which the task must be performed and the material required for the task.
 - b. Task standards - Those specific measurable condition or event standards required for task completion.
 - c. Performance measures - These are the specific task performance requirements. This is usually a step-by-step task procedural guide which includes either specific performance measures (e.g., "Drive the swivel stake through the center hole of the base

plate with the hammer") or technical references where detailed measures may be obtained (e.g., "Refer to TM 11-5820-348-15, Chapter 2, Section II, paragraphs 2-4 and 2-5a(1), page 2-3") (DA, 1985d).

- d. How-to instructions - These are specific instructions and illustrations, condensed and consolidated from several different publications, provided among the performance measures on how to actually perform a given task (e.g., Task 113-588-1088 Install/Recover Communications Wire Lines, "a. Culvert crossing [figure 1088-5]. When a road must be crossed, the wire should be passed through a culvert if at all possible" [DA, 1985d]).
5. Training material reference list - A listing of those training alternatives available for that particular task (e.g., Training Extension Course [TEC] lessons, FMs, TMs and special training documents). Training aids and devices are not presently listed in all SMS; however, some TRADOC service schools do list their Exportable Training Materials (ETM) available for a particular task (e.g., ETM Embedded Training Modules for battalion and division TACFIRE Operators available from the U.S. Army Field Artillery School).

A content summary of typical ITEP documents is shown in Table A-2.

These documents are intended to provide the individual soldier with all the information needed to understand the conditions under which the task will be performed, the standards to which the task must be must performed, how performance is measured against the standard, instructions on how to perform the task, and references for additional study.

Table A-2

Summary of Individual Training Document Contents

	Trainer's Guide *	Soldier's Manual **
General Elements		
Purpose	X	X
Enlisted Personnel Management System		X
Explanation of Army Training System	X	
Trainer's Responsibilities	X	
Conduct of Individual Training	X	
Conduct of Collective Training	X	
Specific Elements		
MOS Critical Task Title List	X	X
Task Conditions, Standards, Performance Measures, and How-to Instructions		X
Training Material Reference List	X	X
Suggested Sustainment Training Frequency	X	
ARTEP Reference for tasks	X	

Source: * DA 1982a, 1983b, 1985b.
1983a,b.

** DA 1981b,c; 1982b,c,d;

ARMY TRAINING AND EVALUATION PROGRAM (ARTEP)

The overall Army Training and Evaluation Program (ARTEP):

1. Prescribes the critical collective missions and tasks that must be performed by the unit in combat;
2. Defines the conditions of performance;
3. Provides guidance for developing the collective skills required for the missions; and
4. Provides the standards for mission and task performance for a given type unit.

The collective tasks of the ARTEP include individual tasks from the Trainer's Guide and Soldier's Manual, and as defined by independent analysis of missions. The ability of a unit to perform collective task missions is based on each soldier's mastery of individual tasks and the ability of individual soldiers to perform those tasks as part of a team in a collective effort.

The Army Training And Evaluation Program (ARTEP) is partially defined by the documents included in the program. These are listed and described in Table A-3.

Table A-3

Army Training and Evaluation Program (ARTEP) Documents Summary

Standards	Methods	Documents
Battle Drill proficiency	Battle Drills	Drill Books Field Manuals
Mission proficiency	STX FTX LFX, CPX, etc.	Mission Training Plan

Source: DA, 1984c

Field Manuals

Field Manuals (FM) disseminate general and specific doctrinal tactics and operational techniques. For example, Field Manual 7-20, Infantry Battalion (Infantry, Airborne and Air Assault), provides general information about the Infantry Battalion in the AirLand battle and specific information about the battalion's organization, command and control procedures, offensive operations, defensive operations, retrograde operations, operations requiring special considerations, combat support procedures and combat service support procedures. Published Field Manuals cover all branch (specialty) areas and a variety of general and specific subjects. FMs provide a tactical and operational framework within which an ARTEP can be employed (DA, 1984a).

Drill Books

Drill Books contains collective training information and guidance for the platoon and squad levels of organization. The primary and most important training guidance given in Drill Books concerns Battle Drills. Battle Drills are standardized elements of performance that are to be conducted in exactly the same fashion Army-wide. For example, one Infantry platoon Battle Drill is entitled "Conduct Fire and Maneuver (Dismounted)." Battle Drills link critical individual task performance and collective task performance. Battle Drills are intended to be mastered to the point where each member of a unit conducting a Battle Drill knows exactly what to do in a given situation, as well as the exact relationships of what each individual does with the activities of other individuals in the unit.

Each Drill Book contains the following elements:

1. An introductory chapter describing the purpose and importance of drill training, and a general discussion of how to conduct Battle Drills.
2. The Battle Drills themselves. Each Battle Drill contains:
 - a. A description of the task to be performed.
 - b. A description of the initiating cue for the Battle Drill.

- c. The standards of performance of the Battle Drill, in terms of the required outcomes (and time, if applicable).
 - d. A listing of individual tasks supporting the Battle Drill.
 - e. Illustrations of how the Battle Drill should be conducted (if applicable).
 - f. Performance measures--a clear description of the observable tasks that soldiers must perform to accomplish the Battle Drill.
 - g. Set-up instructions that describe necessary resources, conditions, and preparations for conducting the Battle Drill.
 - h. Talk-through instructions for the Battle Drill (if required).
 - i. Walk-through instructions for the Battle Drill (if required).
3. Appendixes, including a cross-reference of individual tasks to Battle Drills.

Mission Training Plans

Mission Training Plans (MTPs) are descriptive training documents that provide battalions, companies, and platoons (and equivalent TOE units) a clear description of what and how to train to achieve proficiency in the unit's wartime missions. MTPs identify and elaborate on critical wartime missions in terms of comprehensive Training and Evaluation Outlines (T&EOs), and provide exercises and other related training management aids to assist commanders in planning and executing effective unit training.

A key element of the MTP is the T&EOs. These are the performance standards that are the basis for internal and external evaluation of the unit's mission proficiency. T&EOs contain tasks, conditions, and standards for each collective task required to be performed by the unit in accomplishing each of its missions. Each collective task is divided into collective subtasks (as applicable), each with its own conditions and standards. Supporting individual tasks are identified for each collective task and subtask.

A second key element of the MTP is training exercises. Several types of exercises may be incorporated in an MTP, including the following:

1. Situational Training Exercises (STX)--short, scenario-driven mission-oriented tactical exercises that provide a vehicle for training a group of closely related collective tasks and Battle Drills. STXs provide pre-defined, short-term exercises that are essential for collective sustainment training to develop and maintain unit tactical proficiency. Unlike Battle Drills, STXs are somewhat flexible--they do not establish the method of execution of the exercise as doctrine. STXs are provided for all platoon and company level missions.
2. Field Training Exercises (FTX)--are larger-scale longer-term training exercises that are composed of multiple STXs, to approximate the conditions of a wartime mission. FTXs are provided for company and battalion level collective training, and in some cases for platoon level training. FTXs are the highest level exercises used by platoons, companies, and battalions to train to mission proficiency. FTXs are developed for each unit level, as required.
3. Other exercises, including Command Post Exercises (CPX), Command Field Exercises (CFX), and Live Fire Exercises (LFX) are developed and provided as required.

MTPs are organized as follows:

1. Chapter 1 provides an overview of the content, purpose, and utilization of the MTP, including discussions of unit missions and collective tasks, training principles, and how to conduct training, evaluation, and feedback.
2. Chapter 2 provides Training Matrixes that relate training elements to other training elements and to publication references. Typical Training Matrixes included in Chapter 2 are a Mission to Collective Task Matrix, a Publication Reference to Collective Task Matrix, and a Battle Drill/Collective Task to Individual Task Matrix.
3. Chapter 3 contains Mission Outlines for each of the unit's missions. The Mission Outlines illustrate how lower-level tasks relate to missions, and how the various exercises (STX, FTX) and collective tasks relate to each mission.
4. Chapter 4 includes descriptions (and outlines, in some cases) of all collective training exercises for the unit. Each exercise description includes:

- a. A statement of the objective of the exercise.
 - b. Interfaces of the exercise with supporting exercises.
 - c. Illustrations and scenarios of the exercise, including Operational Orders (OPORD), as applicable.
 - d. A listing of support requirements for the exercise.
 - e. T&EOs for the exercise.
5. Chapter 5 contains a comprehensive listing of T&EOs for all of the unit's collective tasks. These are used in internal evaluation of collective task and mission performance.
6. Chapter 6 describes means and methods of external evaluation of the unit's performance of missions and collective tasks, including a listing of support requirements for external evaluations.

MTPs guide and structure the training developed and conducted by the unit, to develop and sustain combat capability of units. Each unit commander is responsible for using the guidance in MTPs to develop a comprehensive training program for his unit and subordinate units to create and sustain the capability to fight and win.

APPENDIX B

AN EXAMPLE PRODUCT: FIBER OPTIC GUIDED-MISSILE (FOG-M) SYSTEM EMBEDDED TRAINING COMPONENT OPERATOR'S MANUAL

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HOW TO USE THIS MANUAL

GENERAL

The Embedded Training Component (ETC) Operator's Manual contains information needed to operate the ETC and to conduct individual or collective training without an actual missile flight.

CONTENTS OF THE MANUAL

This manual provides a description of the FOG-M ETC and how to operate it. Instructions are provided to conduct individual and collective training utilizing individual lessons of the ETC; connecting lessons together to provide a structured learning experience; and instructions on how to use the ETC for a full mission scenario from pre-launch procedures to target assessment. Maintenance instructions are contained in Chapter 3.

ORGANIZATION OF CONTENTS

This manual has been divided into chapters, sections and paragraphs that are numbered in order.

CHAPTER 1
INTRODUCTION

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II EMBEDDED TRAINING COMPONENT DESCRIPTION	B-9
1-3. Embedded Training Component (ETC) Characteristics and Features	B-9

CHAPTER 1

SECTION I. GENERAL INFORMATION

1-1. SCOPE. This manual provides instructions for operating the Embedded Training Component of the FOG-M training system using resident software and on-board equipment hardware. This manual is for use by all personnel who perform hands-on operation of the equipment. It is intended for use in Fiber Optic Guided Missile (FOG-M) System Gunner training.

a. ETC Equipment. The ETC consists of the following equipment:

- (1) Resident computer software (Part of FOG-M System Computer).
- (2) ETC specific videodiscs.
- (3) Digital Map Generator (DMG) cassette tapes.

b. Support Equipment. No support equipment is required for the ETC.

c. Purpose of Equipment. The ETC provides instruction and training capabilities which can be utilized in unit level individual and collective training without actual missile firings. The ETC is capable of training specific functions of the FOG-M gunner in six separate lessons and upon conclusion of the structured lessons, simulates a full mission, single missile, flight from pre-launch to impact assessment.

1-2. MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

CHAPTER 1

SECTION II. EMBEDDED TRAINING COMPONENT DESCRIPTION

1-3. EMBEDDED TRAINING COMPONENT (ETC) CHARACTERISTICS AND FEATURES. The ETC allows training Gunner operations for the Fiber Optic Guided Missile System without the actual flight of a missile. The ETC, along with the various on-board hardware components, provides training and simulation of the different phases of a FOG-M mission, including pre-launch procedures, single missile flight and navigation, target detection, selection, lock-on, and impact assessment.

ETC FEATURES

- a. The following are available during training:
 - (1) Instructions.
 - (2) Automated performance measurement.
 - (3) Automated performance assessment.
 - (4) Hints and aids.
 - (5) Automated performance feedback.
 - (6) Two FOG-M system introduction lessons.
 - (7) Six lessons covering specific mission phases.
 - (8) One full mission scenario incorporating all mission phases.

CHAPTER 2
OPERATING INSTRUCTIONS

CONTENTS

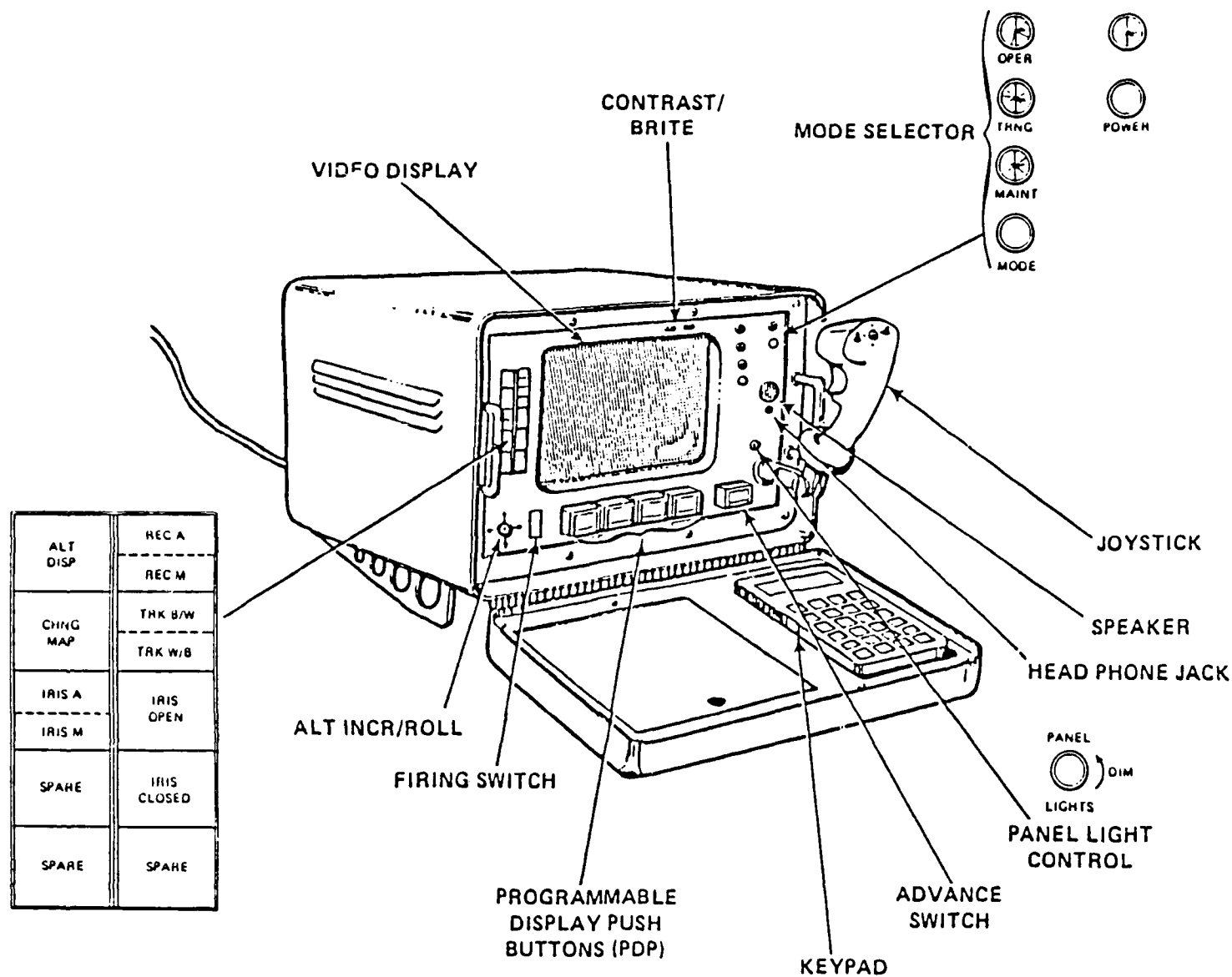
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CHAPTER 2

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. DESCRIPTIONS AND USE OF OPERATOR'S CONTROLS AND INDICATORS:

1. See Figure B-1, Gunner Station Console, for illustration.
2. See Table B-1, FOG-M System Gunner Station Controls and Indicators, for use of FOG-M gunner's controls and indicators.



Source: Purifoy, G. R., Chenzoff, A. P., Harris, C. B., Roth, J. T., and Strasel, H. C. (1985) FOG-M System Task and Training Requirements Analysis for Embedded Training

Figure B-1. FOG-M gunner station console.

Table B-1

FOG-M System Gunner Station Controls and Indicators (As depicted in Figure B-1)

<u>Function</u>	<u>Description</u>
Video Display	7.2 X 5.4 inch color monitor.
Contrast/Brite Thumbwheels	Allow gunner to adjust contrast and brightness of video display to desired level.
Mode Selector	A push button for selecting one of the following three modes: OPER - Operate in the normal mode in which the system initializes. MAINT - Maintenance is used by FOG-M system technicians to troubleshoot. TRNG - Training is used for the Embedded Training Component (ETC).
Power Switch Indicator	Applies power to the FOG-M system; indicates that power is available to the FOG-M system.
Joystick	Allows gunner to make inputs during planning and to control missile seeker and missile flight attitudes.
Speaker/Head Phones	Presents audio prompts.
Panel Light Control	Adjusts panel light level.
Keypad	4 X 6 key alphanumeric keypad, used to input to the computer.

Table B-1

FOG-M System Gunner Station Controls and Indicators (As depicted in Figure B-1)
(Continued)

PDPs	<p>Programmable Display</p> <p>Pushbuttons (PDP) display operator prompt messages; pressing a flashing PDP indicates a positive reply to a message, pressing ADVANCE indicates a negative reply. The left PDP usually displays the operational mode. Whenever the left PDP is flashing and it is pressed, it will select the displayed mode. If pressed when not flashing, exits that mode and allows the operator to select another mode.</p>
Advance Switch	<p>Sends messages to the computer that the gunner wants to skip the prompt on the flashing PDP; when more than one PDP is flashing, the ADVANCE switch has no effect when pressed.</p>
Firing Switch	<p>A guarded toggle switch that applies the missile firing command to begin launch countdown.</p>
ALT INCR/ROLL	<p>Controls missile altitude (in increments of 10 meters) and missile roll.</p> <p>DOWN/UP - Altitude LEFT/RIGHT - Roll</p>
REC A or M	<p>M (Manual) records current video display for as long as the switch is pressed. A (Automatic) records video display for as long as any missile is airborne.</p>
ALT DISP either map or seeker	<p>Alternate display selects video.</p>

Table B-1

FOG-M System Gunner Station Controls and Indicators (As depicted in Figure B-1) (Continued)

CHNG MAP	Change map puts a map menu on the video display for modification or map characteristics. When inputs are complete, the previous mode can be re-entered at the point the mode was exited.
IRIS A or M	Toggles between automatic and manual control of the seeker iris.
IRIS OPEN/CLOSED	Self-centering switch that adjusts iris diameter.
TRK (TRACKER MODE SELECTOR)	Instructs seeker to track either a dark target on a light background (B/W) or a light target on a dark background (W/B).

SECTION II. OPERATION UNDER USUAL CONDITIONS

2-2. GENERAL. This section of the ETC Operator's Manual contains instructions for conducting individual and collective training using the FOG-M Embedded Training Component.

a. SKILL LEVELS

Following the suggested training guidelines given below, the ETC is capable of providing four different levels of skill performance training. These levels and their definitions follow:

- (1) Initial Training. This is initial, learn the task, training given to a new trainee, whether in institutional training (initial entry) or in unit training (cross training).
- (2) Proficiency Training. This is training conducted to bring critical task performance to minimum standards.
- (3) Sustainment Training. Sustainment training is that training, conducted in the unit, to sustain required critical task performance standards.
- (4) Expert Training. Expert training extends the FOG-M Gunner's proficiency beyond minimum performance standards by creating higher than minimum acceptable performance standards. Separate performance standards necessary for Expert Training have been provided where possible. This option may be selected from the menu prior to running a lesson.

b. FIVE "P" MODEL OF TRAINING

(1) Field Manual 25-3, Training in Units, prescribes the five "P" model of training and will be used as a guide throughout the discussion of individual training using the ETC. We will first define these steps and discuss their use within the Embedded Training Component.

(a) Planning (Pre-test evaluation, if applicable)

Planning, or pre-test evaluation, must be considered from the general to the specific. Initially, an evaluation of all required tasks must be performed to identify those tasks performed below standard. Second, those tasks performed below standard must be evaluated to determine the extent of the deficiency and isolate the learning problem(s).

The full mission scenario contained in Lesson 9 of the FOG-M ETC can evaluate and provide performance feedback for 22 of the 23 individual tasks required to fly a single missile mission. This lesson has the capability of providing feedback to the trainer about the soldier's performance for each of the required tasks and sub-tasks. Below standard performance for any task used in the scenario can be identified for retraining. The trainer can then identify the specific learning deficiency - skills and/or knowledge, and the degree of deficiency.

The FOG-M ETC is constructed in such a way that a soldier may, on his own, operate the ETC in a structured or selective fashion. It is menu driven and, therefore, offers selected individual task training options or a structured building block methodology.

The trainer, or soldier, must possess the prerequisite skills and knowledge required to perform any individual task. Since the ETC is primarily designed to provide unit individual sustainment training, it is assumed that soldiers operating the ETC will have been school trained on the system. They will have been trained to minimum performance and possess the essential knowledge required to operate the FOG-M System.

However, the capability also exists within the FOG-M ETC to provide initial and proficiency training in gunner tasks. This capability can serve to reinforce the skills and knowledge of the sustainment soldier, as well as provide initial and proficiency training capability to the unit commander during periods of personnel turbulence; i.e., combat or trained personnel shortages, thus maintaining higher levels of unit readiness.

The capability also exists within the FOG-M ETC to provide expert training. Expert training consists primarily of higher performance standards for a given individual task. Minimum acceptable standards for a given task may require achieving a score of 70 percent. Experts are required to achieve a 95 percent%, or higher, standard of performance.

This multilevel training capability allows the trainer to tailor ETC training to the skill and knowledge level required for the individual soldier. The unit commander has a training tool that addresses the three soldier performance levels usually found in a unit. It has three levels of training, single and multiple task assessment capability, and full mission training and assessment capability.

Where several tasks require training, they will generally be placed in sequential learning order as one task may present the prerequisite skills and knowledge required to perform another task. Where there is no apparent connection between deficient tasks, the order of presentation is unimportant.

(b) Preparing (Trainer knows the task, knows the ETC, trains prerequisite skills/knowledge)

The trainer must be familiar with the task prerequisite skills and knowledges as well as those required to perform the task. He must understand the structure and capability of the ETC.

Training of prerequisite skills and knowledge required of a given task may be conducted through use of alternative training options; i.e., manuals, videotapes, TEC, etc., or may be trained utilizing a prior ETC lesson containing required prerequisite skills and knowledge. Training alternatives selection may be governed by several factors; i.e., number and availability of personnel to be trained, time, availability of resources, level of training required, etc.

(c) Presenting (Motivates soldier, operates ETC)

Soldier motivation is a topic that is best discussed elsewhere; however, it should be mentioned that because of the nature of the FOG-M ETC, individual or unit competition is enhanced by its unique full mission assessment capability and expert level of performance standard.

Operation of the ETC should not be performed until the trainer has assessed the training to be conducted. He can then guide the soldier through a structured learning process to achieve the desired standard of performance. Each soldier will have a unique learning requirement ranging from the very simple to the complex. Through proper assessment, sequential task menu selections, repetitions, and post-training assessment, each FOG-M soldier's training needs can be diagnosed and trained to standard.

(d) Practicing (Train to standard - repetition)

Practice is a built-in component of the FOG-M ETC. Repetition is available in all of the ETC lessons. In order to allow option flexibility, however, a soldier is not locked into a lesson when he fails to perform to the acceptable standard. Upon completion of a given task within a lesson, whether standard has been achieved or not, the soldier is given the opportunity to repeat the task or continue on to the next task or lesson. Therefore, a soldier may progress at his own pace in a flexible way, returning to the sub-standard performance task at a later time. This flexibility allows maximum learning for different learning styles. In this way, the beginner can maximize his

learning, the average performer can strive for expert status, and the expert can maintain his performance skills at a high level.

(e) Performing (Post-test evaluation)

Post-test evaluation is available within each lesson as well as the final full mission scenario lesson. Performance measurement and assessment are automated and feedback is provided the student and trainer for performance evaluation. This reinitiates the process all over again. The post-test evaluation becomes the pre-test evaluation, and a new training design is initiated, or the student progresses to the next stage of the established training path.

c. TRAINING AND EVALUATION GUIDELINES - INDIVIDUAL TRAINING

(1) Initial Training

As stated earlier, this training is provided to the individual who has no familiarity with the FOG-M System or the Embedded Training Component. These individuals may be in an institutional setting (FOG-M Gunner's School), or in an operational unit setting (cross-training).

(a) Planning. Generally, no pre-evaluation for the introductory student is necessary.

(b) Preparing. The FOG-M System Operator's Manual (TM 9-1425-890-10), ETC Operator's Manual (TM X-XXXX-XXX-XX), and pertinent tactical employment literature (FMs) will provide the prerequisite knowledge to begin Lessons 1 and 2 of the ETC.

(c) Presenting. Lessons 1 and 2 should be presented at this point. The trainer should assist the introductory student with initializing steps and ETC operations.

(d) Practicing. The student listens and observes Lessons 1 and 2. These lessons do not require interaction from the student.

(e) Performing. Following completion of Lessons 1 and 2, the trainer should orally quiz the student to determine the amount of information absorbed. TEC Lessons, or an embedded testing capability, may be developed at a later date to provide a structured and consistent post-test evaluation capability. Should the student not demonstrate sufficient prerequisite knowledge to proceed, he returns to the Planning stage emphasizing those knowledges not learned. Again, he progresses through the five "P's," repeating them as many times as necessary until he demonstrates sufficient knowledge to proceed to Lesson 3.

Figure B-2 presents a flowchart for initial training.

(2) Proficiency Training

Proficiency training is that training required to bring a soldier to minimum task performance standards. Progression through each ETC lesson is based upon successfully meeting the minimum performance standard required for that lesson. This pattern is repeated for each successive lesson until reaching the full mission scenario where all prior learned skills and knowledges must be applied, in sequence, to accomplish a mission.

(a) Planning. The planning phase requires the trainer to insure that the student has the prerequisite skills and knowledge required to enter proficiency training. This is normally accomplished

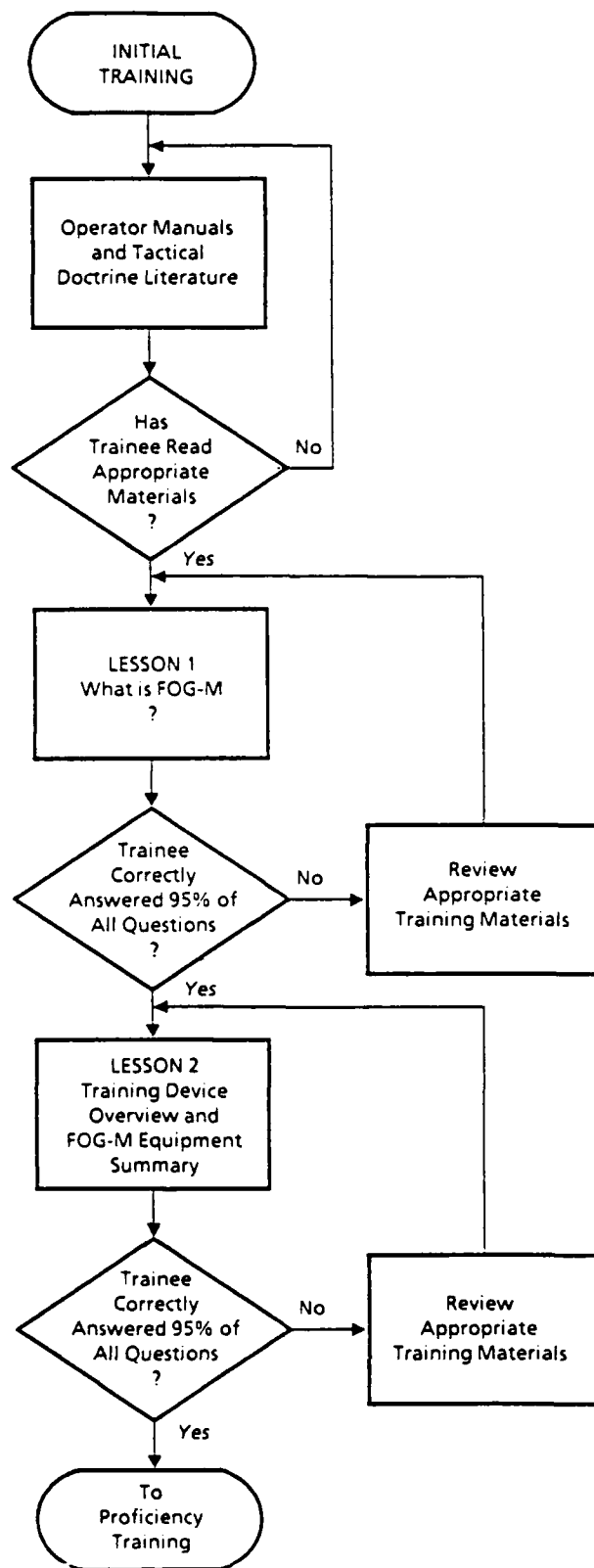


Figure B-2. Initial training flowchart.

by testing the soldier's knowledge gained from Lessons 1 and 2. If the soldier meets this standard, then progression to Lesson 3 is allowed. Otherwise, the soldier is once again returned to study materials and must repeat Lessons 1 and/or 2.

(b) Preparing. The preparing phase requires that the trainer have a thorough knowledge of the task to be trained and the ETC's ability to train that task. Other training alternatives may need to be immediately available during the session, or at least have been studied, prior to beginning a task. For example, a soldier may need to study the FOG-M Operator's Manual chapter dealing with the missile seeker prior to attempting Lesson 4, Using the Seeker. The trainer must insure that all available study materials are utilized to assist the student in gaining the skills and knowledge required to accomplish the task.

(c) Presenting. The trainer assists the student in initializing the FOG-M System, entering the Training Mode, logging on the system and making the menu selections appropriate to the training task.

(d) Practicing. During this phase, the student interacts with the ETC lesson by following directions and performing those actions required by the task. All lessons provide minimum essential instruction to accomplish the task, followed by progressively more difficult portions of the task. Each action by the student is measured and evaluated by the ETC and the student is provided immediate feedback on his performance with an opportunity to improve. This performance feedback with repetition opportunity is the heart of this learning phase.

(e) Performing. Some lessons have a post-test component which can be used to test the soldier's performance on that particular task. All lessons, however, provide post-lesson performance feedback. This feedback can be used by the trainer to evaluate successful or unsuccessful minimum performance standards. This determination will send the student to the next lesson, return to the beginning of the same task, or only that portion of the task which was not accomplished to standard. For example, a student taking Lesson 6, Target Detection and Selection, is able to detect the targets; however, he selects an enemy truck when an enemy tank is visible and is the more appropriate target. The student would have met the standard for target detection, but have failed in target selection. The student would then be required to redo only that part of the task which was unsuccessfully completed. This can be accomplished through menu selection. Assuming the student has completed all lesson tasks to minimum acceptable standard, he would progress to the next lesson. The ultimate post-test evaluation is Lesson 9, Full Mission Scenario, where all prior tasks are linked together in sequential order to launch a missile, navigate it to the target area, detect and select a target, hit the target, and percent assess the damage to the target. Based on performance feedback

from Lesson 9, Full Mission Scenario, the soldier is returned to a specific lesson for remediation or, if all tasks were performed successfully, the soldier is considered trained on all critical FOG-M flight tasks.

Figure B-3 presents a flowchart for proficiency training.

(3) Sustainment Training

In the majority of situations, the ETC will be utilized to sustain task performance of the already proficient soldier. Many of the FOG-M Gunner skills and knowledges require frequent practice. Due to missile constraints, range limitations, or other problems, these skills and knowledges can't be exercised to sustain minimum acceptable task standards. Because of individual soldier differences, not all required skills and knowledges deteriorate at the same rate. The suggested procedure for trained soldiers is to have them operate Lesson 9, the full mission scenario. This will provide feedback about the soldier's performance for each phase of the mission. Any phase(s) not performed to minimum standard can be identified and the soldier directed to the specific lesson(s) dealing with the sub-standard performance. Upon successful minimum task performance for the deficient phase(s), the soldier should again operate Lesson 9, with a different scenario, for performance evaluation. This process is repeated until the soldier performs a full mission scenario to minimum task standards.

(a) Planning. Evaluation of sustainment training for the 11H soldier is accomplished through Lesson 9, Full Mission Scenario. This lesson requires the soldier to perform required FOG-M Gunner tasks from pre-launch to assessing missile impact. The soldier performs all required tasks, without instructions, hints, or cues, to destroy a scenario target. Performance is monitored, evaluated, and performance feedback provided upon scenario completion.

(b) Preparing. Based upon full mission scenario performance, the soldier's deficiencies, if any, can be identified. If these deficiencies are such that they can be retrained through operation of a specific ETC lesson, then that lesson should be used. If the deficiency is such that some other training alternative (documents, videotape, etc.) is required, then that approach should be used. Sometimes, other training alternatives and the appropriate ETC lesson will need to be used. Every training situation is different and the trainer must pay close attention to diagnosing the student's learning problems so that the appropriate training tools can be brought to bear on the problem. **Often, the greatest difficulty is in identifying the problem rather than the solution.**

Once the decision has been made that the training problem can be assisted through use of the ETC, the appropriate lesson is identified using full mission scenario feedback information.

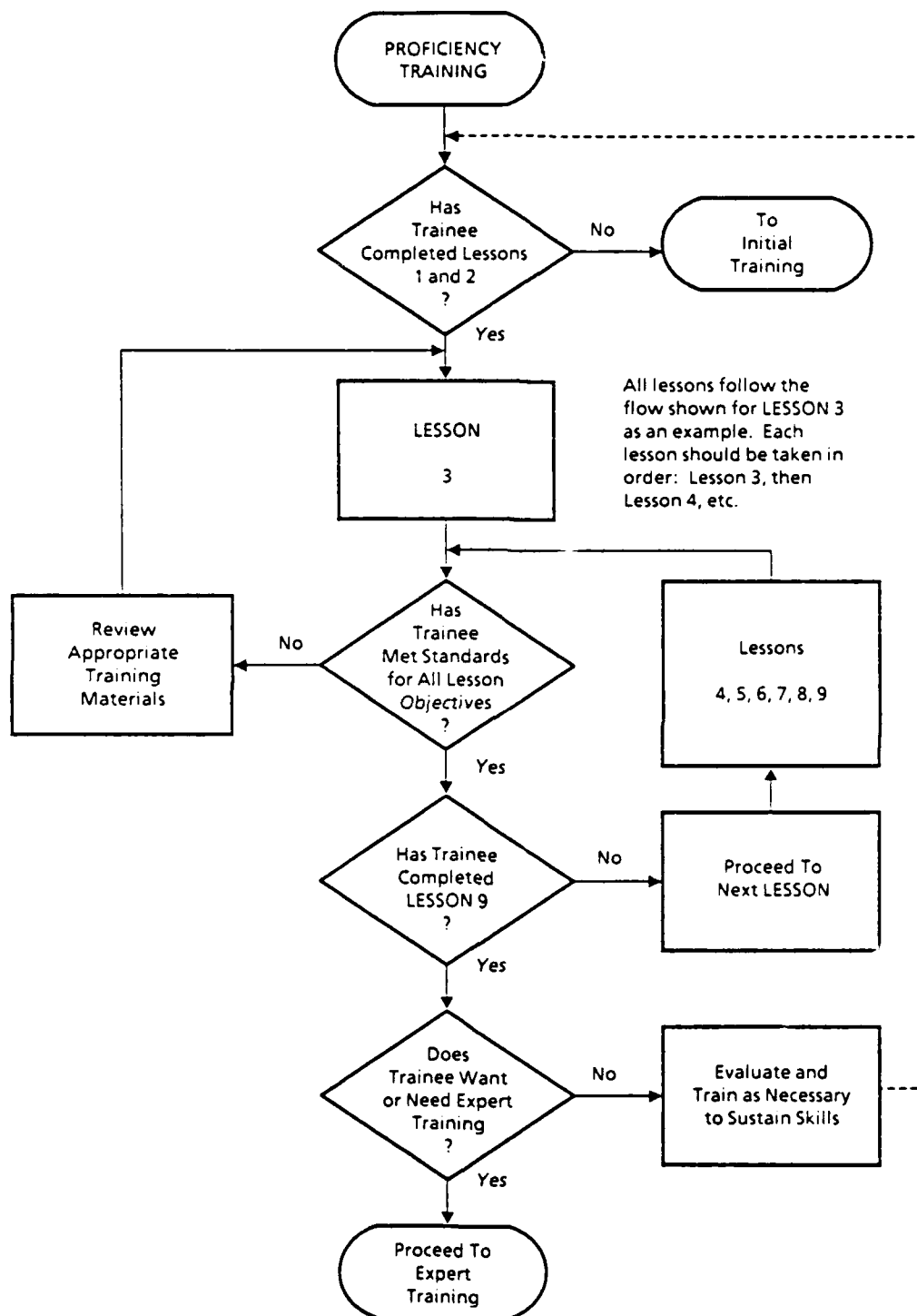


Figure B-3. Proficiency training flowchart.

(c) Presenting. The soldier is then presented with the proper sequence of lessons as determined by the trainer.

(d) Practicing. Each lesson must be completed to the appropriate standard before progressing to the next lesson in the sequence.

(e) Performing. The last stage in the training process is to determine overall performance through use of the full mission scenario contained in Lesson 9. Completion of prior lessons should have brought the soldier back to minimum acceptable task standard for each phase of the mission. Again, the soldier completes a full mission scenario, performance measured, evaluated, and feedback provided upon mission completion. The trainer is brought full circle to the preparing phase.

Figure B-4 presents a flowchart for sustainment training.

(4) Expert Training

Expert training provides a means of allowing the good FOG-M Gunner to become even better by raising the standards against which he is evaluated. The actual ETC training and performance measurement is the same for the expert as for the sustainment FOG-M Gunner. The difference lies in the standard demanded by the ETC to achieve expert status. All ETC performance standards can be evaluated as a percentage of some required action correctly performed against some expected standard (e.g., five correct target markings versus seven expected correct target markings leads to a 71 correct performance). If the minimum acceptable standard for sustainment training is 70 percent, then this soldier would have met the standard. What happens, however, if we raise the standard to 85 percent? The soldier must now correctly mark six out of the seven available targets. Or 100 percent, requiring seven out of seven correctly marked targets.

By raising the performance standard for a given task, the individual FOG-M Gunner can compete against himself, or against others within his unit. This competition factor increases individual performance, morale, and overall unit readiness. **Expert training is NOT for every soldier, however.** Some soldiers, due to individual differences, are operating at their maximum abilities to accomplish the minimum performance standard. **Any commander that expects all of his soldiers to achieve expert status will be due for disappointment.**

(a) Planning. The sustainment FOG-M Gunner who meets all task minimum acceptable standards based upon completion of Lesson 9, Full Mission Scenario, is now ready to attempt Expert Training. Scores obtained for each phase of the full mission scenario should be evaluated to determine those which require practice to raise performance to expert standard. Once these phases have been identified, the appropriate ETC task lesson should be chosen.

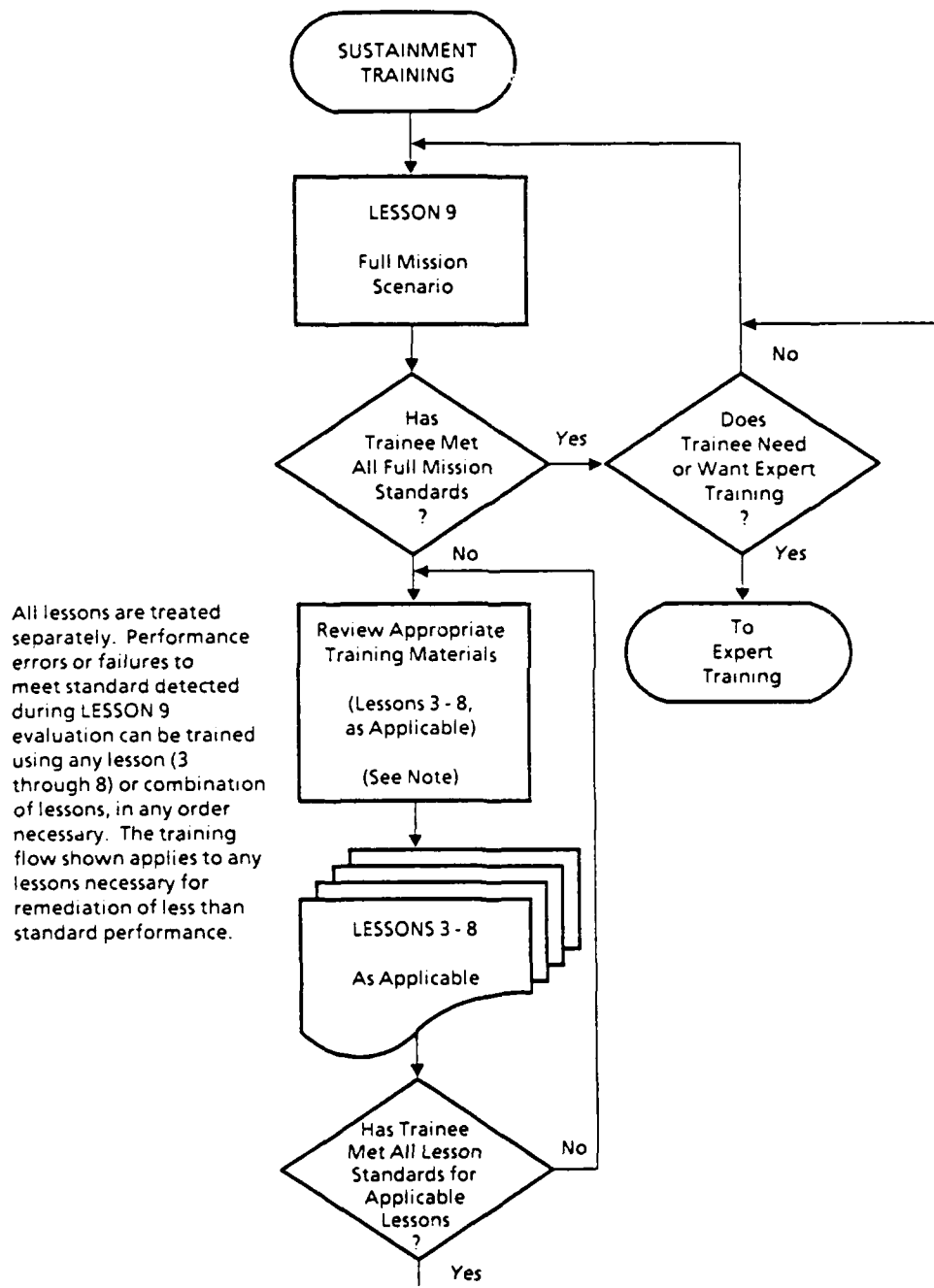


Figure B-4. Sustainment training flowchart.

(b) Preparing. An evaluation should be made to determine whether additional or expanded prerequisite skills and knowledges are required to perform at this higher standard, or whether practice will be sufficient to improve performance. If such additional or expanded skills and knowledges are required, then they should be obtained before going further.

(c) Presenting. The appropriate assessment status (Sustainment/Expert) is chosen from the menu, as well as the appropriate lesson(s).

(d) Practicing. The student practices the particular task until the expert performance standard has been achieved.

(e) Performing. When all required tasks (lessons) have been completed to expert performance standard, the full mission scenario is once again attempted while in the expert performance standard mode. If the soldier successfully accomplishes all performance standards, based upon mission completion feedback, he is awarded expert FOG-M Gunner status. If a standard is not met, the soldier once again returns to the Preparing stage to repeat the process.

Figure B-5 provides a flowchart for expert training.

d. TRAINING AND EVALUATION GUIDELINES - COLLECTIVE TRAINING

The Army Training and Evaluation Program (ARTEP) Mission Training Plans have been developed to train and evaluate unit collective performance.

Given the training constraints of limited ammunition allowances, range space, and time available, the use of the ETC for collective training and evaluation is a viable option to live missile firing during collective training exercises.

The Embedded Training Component (ETC) can be utilized as a tool for training and evaluation of a FOG-M unit's performance.

The FOG-M ETC Full Mission Scenario (Lesson 9) provides a means for collective training and evaluation. The FOG-M section can receive their mission briefing, pre-select their launch sites, provide overwatch, move to and prepare their launch site, communicate with the Fire Control Section, and receive a fire mission; operate the Full Mission Scenario (Lesson 9) through launch, cruise, terminal, and impact assessment phases; report to higher headquarters; relocate to another launch site and repeat the process again; and then continue through the remaining steps of the exercise to completion. This capability allows the full flow of a mission, without disruption, from the first step through the last step, thereby creating more realistic and full mission unit training.

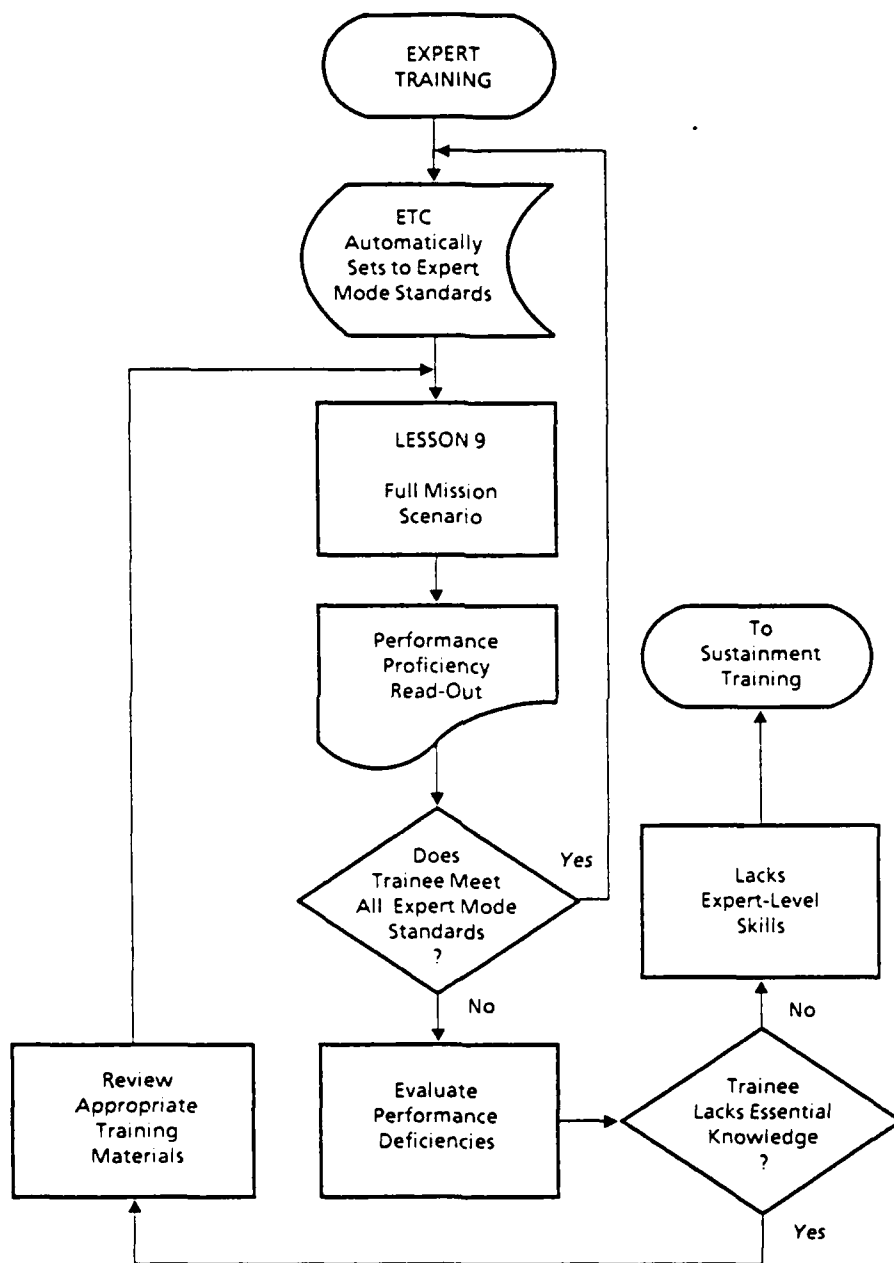


Figure B-5. Expert training flowchart.

2-3. LESSON 1 - What is FOG-M?

1. TRAINING TIME: 1 hour

2. DESCRIPTION: This lesson consists of the following information about the Fiber Optic Guided Missile (FOG-M) System:

- a. General narrative overview of the FOG-M System.
- b. Narrative explaining what the FOG-M System does.
- c. Audiovisual presentation of the FOG-M major sub-systems.
- d. Audiovisual presentation of the FOG-M mission phases.
- e. Audiovisual presentation of the FOG-M functional capabilities.
- f. Audiovisual presentation of the FOG-M equipment capabilities.
- g. Narrative discussion of the unique, noteworthy characteristics of the FOG-M System.
- h. Audiovisual presentation of the skills and knowledges required of a FOG-M Gunner.

3. TRAINING OBJECTIVES:

- a. Understand the FOG-M System.
 - (1) State what the FOG-M System is.
 - (2) State what the FOG-M System does.
 - (3) State the major sub-systems of the FOG-M System.
 - (4) State what is noteworthy about the FOG-M System.
 - (5) State the capabilities of the FOG-M System.
 - (a) State the functional capabilities of the FOG-M System.
 - (b) State the equipment capabilities of the FOG-M System.
 - (6) State the required FOG-M Gunner skills and knowledges.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-2.

5. TRAINING SUGGESTIONS:

Lesson 1, "What is FOG-M", of the ETC doesn't require student interaction, and notes should be taken of the presented information. The soldier should have reviewed the FOG-M system Operator's Manual (TM 9-1425-890-10) prior to beginning this lesson. There are no presently available testing materials, but using material from Lesson 1 and other available reference sources, a resourceful trainer could create a very adequate testing document.

Table B-2

Lesson 1, What is FOG-M -- Skills, Knowledges, and Standards

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
UNDERSTAND THE FOG-M SYSTEM				Recognize the facts.
STATE WHAT THE FOG-M SYSTEM IS	None	None	FOG-M is a fiber- optically controlled, video guided mobile missile system.	Recognize the facts.
STATE WHAT THE FOG-M SYSTEM DOES	None	None	FOG-M fires single missiles or salvos at hardpoint targets such as tanks. Missiles can be auto- matically or manually guided. Phases of missile flight.	Recognize the facts.
STATE THE MAJOR SUB- SYSTEMS OF THE FOG-M SYSTEM	None	None	HMMWV, missile launcher, missiles, gunner's console.	Recognize the subsystems.

Table B-2

Lesson 1, What is FOG-M--Skills, Knowledges, and Standards (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
STATE WHAT IS NOTEWORTHY ABOUT THE FOG- M SYSTEM	None	None	Missile sends back video via fiber- optic link; automatic pattern recognition; real-time guidance via computer or human interface; embedded training maximizes gunner capability and hit rate.	Know the noteworthy facts.
STATE THE CAPABILITIES OF THE FOG-M SYSTEM	None	None	Land nav via VNAS; FOG-M flight planning and waypoints; auto launch sequence; multi-launch; correlator; auto track; map; manual control; video record and playback; seeker scan; attitude stabiliza- tion; alt. control, BITE; recon.	State the capabilities.

Table B-2

Lesson 1, What is FOG-M--Skills, Knowledges, and Standards (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
STATE FUNCTIONAL CAPABILITIES OF THE FOG-M SYSTEM	None	None	Auto. land nav.; flight planning and waypoints; auto launch sequence; multiple launch; pattern recognition; map; manual control; simple user interface; video view; recon capability; video record and playback.	State the capabilities.
STATE THE EQUIPMENT CAPABILITIES OF THE FOG-M SYSTEM	None	None	Land nav via VNAS; video recorder; autotrack; map display; seeker slew; independent altitude control; seeker independent of or slaved to correlator; salvo; BITE; launcher based computer; fiber-optic link.	State the capabilities.

Table B-2

Lesson 1, What is FOG-M--Skills, Knowledges, and Standards (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
STATE REQUIRED FOG-M GUNNER SKILLS AND KNOWLEDGES	None	Land navigation; system interface requirements; system deployment; eye-hand coordination; procedure and rule following; visual cue discriminat- ion.	Tracking; target recognition, discrimina- tion, and prioritiza- tion; map reading; map symbology related to video; simple procedures; missile control; mission and route planning; land navigation; system deployment.	State the skills and knowledges to be trained.

2-4. LESSON 2 - Training Device Overview and FOG-M System Equipment Overview

1. TRAINING TIME: 30 minutes (Flight data is classified Confidential)

2. DESCRIPTION: This lesson consists of the following information about the Fiber Optic Guided Missile (FOG-M) System:

a. General narrative overview of FOG-M System characteristics, controls, and displays.

b. Narrative instructions on how to interact with the ETC.

3. TRAINING OBJECTIVES:

a. Understand and recognize FOG-M system equipment, understand fundamental FOG-M parameters.

(1) State the fundamental parameters of the FOG-M system.

(2) State locations of all controls that adjust seeker video.

(3) State the controls that control altitude, pitch, roll, and azimuth.

(4) State the functions required to operate the FOG-M system simulated missile.

(5) Name each control and display on the FOG-M system console and state its function.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-3.

5. TRAINING SUGGESTIONS:

Lesson 2 of the ETC does not require direct interaction by the student. Notes should be taken of the presented information. The soldier should have reviewed the FOG-M system Operator's Manual (TM 9-1425-890-10) prior to beginning this lesson. Only individuals with a valid security clearance and a need to know should have access to this lesson.

There are no materials presently available that can be used to test or evaluate the student's knowledge of the material. Based on the training objectives above, using material from Lesson 1 and other available reference sources, a resourceful trainer could create a very adequate testing document.

Table B-3

Lesson 2, Training Device Overview and FOG-M Equipment Summary --
Skills, Knowledges, and Standards

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
UNDERSTAND AND RECOGNIZE FOG- M SYSTEM EQUIPMENT AND UNDERSTAND FUNDAMENTAL FOG-M PARAMETERS				Recognize the facts, subsystems, and controls.
STATE THE FUNDAMENTAL PARAMETERS OF THE FOG-M SYSTEM	None	None	Missile data is classified.	Recognize the facts.
STATE THE LOCATION OF ALL CONTROLS THAT CONTROL SEEKER VIDEO	None	None	All seeker adjustment controls are located on the Gunner's Console.	Recognize the facts.
STATE THE CONTROLS THAT CONTROL ALTITUDE, PITCH, ROLL, AND AZIMUTH	None	None	Pitch and roll switch, joystick controls, correlator and missile sensors.	Recognize the subsystems.
STATE THE FUNCTIONS REQUIRED TO OPERATE THE FOG-M SYSTEM SIMULATED MISSILE	None	None	Operational ETC and FOG-M systems except missile.	State the subsystems required to operate the simulated missile.

Table B-3

Lesson 2, Training Device Overview and FOG-M Equipment Summary --
 Skills, Knowledges, and Standards (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
NAME ALL CONTROLS AND DISPLAYS ON THE FOG-M CONSOLE AND STATE THE FUNCTION OF EACH	None	None	All gunner's console controls and displays.	Name 100% of controls and displays and correctly state the function for each.

2-5. LESSON 3 - Launch

1. TRAINING TIME: 2 hours

2. DESCRIPTION: This is a three part lesson. Part A provides an audiovisual presentation of Programmable Display Pushbutton (PDP) launch functions with computer controlled PDP lighting or flashing activity.

Part B is an audiovisual presentation of PDP launch functions with computer controlled PDP lighting or flashing activity requiring the student to interact with the system. An incorrect response causes immediate feedback. The last segment requires the soldier to make entries without prompting.

Part C consists of two sections. The first section is an end-of-lesson test with 13 multiple choice questions. This is followed by the presentation of an interactive launch sequence with step-by-step instructions, error feedback, and record-keeping. If the soldier receives a score below the set standard, he is automatically recycled to Part B for a review and retesting. If the soldier receives a score above the set standard, he may choose to go on to the next lesson or recycle through Part B and C to retrain on any errors received.

3. TRAINING OBJECTIVES:

a. Perform launch procedures.

(1) Fire missile.

(a) Select launch function.

(1) State launch selection procedure.

(b) Confirm or correct existing launcher data (launch site, launch heading).

(c) Enter missile guidance data (mission type, target number, route number, target coordinates, missile heading and azimuth).

(1) Determine mission type.

(d) Confirm that enough missiles are available for mission.

(e) Select correlator, if desired.

(f) Launch missile.

launch. (2) Respond to selected major contingencies for missile

launch. (a) State major contingencies during missile

(b) Abort launch of missile.

(c) Respond to failure of missile to fire.

fire. (1) State response to failure of missile to

(d) State response to hung missile.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-4.

5. TRAINING SUGGESTIONS:

The soldier should have completed ETC Lessons 1 and 2 and reviewed Chapter X, Launch Procedures, FOG-M System Operator's Manual (TM 9-1425-890-10).

This lesson will guide the soldier in the proper sequential operation of the PDP's for the launch procedure and assist him in making those decisions necessary to inputting correct data into the system so that the system has correct information to do what it is designed to do. Don't forget that the system can do no better than the information it is provided.

Make sure that the soldier understands the reasons for his errors. This may require rereading a portion of the FOG-M system Operator's Manual or other appropriate literature prior to returning to Part B for retraining and retesting. If the soldier doesn't understand the "why" of his mistake, retraining may be useless.

Table B-4

Lesson 3, Launch -- Skills, Knowledges, and Standards

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
PERFORM LAUNCH PROCEDURES				Perform all launch procedures in an accurate and timely manner.
FIRE MISSILE	Given a FOG-M system and target data.	Speed and accuracy of system information input.	Procedure for missile firing.	Complete launch within x minutes, correcting all errors prior to actual missile launch.
SELECT LAUNCH FUNCTION	Given a FOG-M system.	Manipulation of LAUNCH PDP.	Procedure for selecting launch function.	Perform within x seconds at 100% accuracy.
STATE LAUNCH PROCEDURE	Given a FOG-M system gunner's console.	None	Location of launch PDP, correct procedure.	State procedure accurately.
CONFIRM OR CORRECT EXISTING LAUNCHER DATA (SITE, HEADING)	Given a FOG-M system and correct data.	Use of joystick and keypad.	Procedures for confirming, determining, and entering data.	Perform procedures with 100% accuracy.
ENTER MISSILE GUIDANCE DATA	Given a FOG-M system and missile guidance data or fire mission.	Determine mission type, use PDPs, use joystick, use keypad, read map.	Procedure to enter missile guidance data.	Perform procedures with 100% accuracy.

Table B-4

Lesson 3, Launch -- Skills, Knowledges, and Standards (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
DETERMINE MISSION TYPE	Given a FOG-M system and a fire mission.	Select az/range only, preplanned, or target coordinates.	Procedures for determining mission type and data required for each mission type.	State the three mission types and data required for each; select correct mission type given fire mission data.
CONFIRM THAT ENOUGH MISSILES ARE AVAILABLE FOR MISSION	Given a FOG-M system.	Display mission status tableau, verify number of missiles present.	Procedure for displaying and inter- preting missile status tableau.	Correctly identify number of missiles at 100% level and state whether sufficient for mission.
SELECT CORRELATOR IF DESIRED	Given a FOG-M system and pre-flown mission data with which to correlate.	Determine when correlator use appropriate, select correlator.	Procedure to determine when correlator use is appropriate, procedure to manually select correlator.	Correctly select correlator use 100% of the time; know criteria for correlator use.
STATE MAJOR CONTINGEN ES DURING LAUNCH	Given a FOG-M system gunner's console.	None	Failure to fire, hung round criteria.	State both contingencies and related criteria.

Table B-4

Lesson 3, Launch -- Skills, Knowledges, and Standards (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
ABORT MISSILE LAUNCH	Given a FOG-M gunner's console and indications for missile launch abort.	Determine need to abort, perform missile launch abort procedure.	Indications of launch abort, procedure to abort launch.	Perform abort before missile fires, with 90% accuracy.
STATE RESPONSE TO MISSILE FAILURE TO FIRE	None	None	Indications of failure to fire, appropriate response to failure to fire.	State indications and response steps in correct order.
STATE RESPONSE TO HUNG MISSILE	Given a FOG-M system and hung missile indications.	None	Procedure for hung missile: (1) open CB; (2) remove missile from launcher; (3) close CB; (4) fire next missile (CB= circuit breaker).	State the steps in order and without error.

2-6. LESSON 4 - Using the Seeker

1. TRAINING TIME: 30 minutes

2. DESCRIPTION: The soldier is given an audiovisual introduction to seeker location, functions, and operation. Computer Generated Imagery (CGI) is then used for initial practice with the joystick, followed by realistic video for further orientation to seeker and video controls. The soldier will have the option to skip forward without completing this portion of the lesson.

A still frame of seeker video is presented with a tank in heavy shadow. The soldier must operate video, iris, slew, zoom, and contrast/brightness controls to gain the most advantageous views.

The student is then given a 60 second simulated missile cruise during which he must locate and mark 10 vehicles along the cruise route, maintaining the marker on each target for at least 5 seconds. Marking is done with the cursor, joystick, and joystick trigger. Targets are difficulty level ranked and the soldier is given feedback on the number of targets marked, missed and not seen, plus their level of difficulty. After 3 simulation repetitions, the soldier is provided a summary of his overall performance.

The next segment consists of four increasingly difficult scenarios, each containing Computer Generated Imagery (CGI) geometric figures (squares, circles, triangles, etc) of varying activity, range, location and size. The soldier is again required to detect, track and mark these figures for 5 seconds each. Scenario feedback is in the form of a bar graph indicating each figure in the scenario and marker time on target. The soldier may repeat the sequence of scenarios upon completion of the final scenario.

The last lesson segment consists of a 60 second missile cruise which has actual targets and moves as in real time missile cruise. The soldier must detect targets, select an appropriate target from other possibilities and mark the selected target with the cursor for at least 5 seconds. Continuous feedback is presented with a screen countdown of the five-second marker period, and an audible tone after 5 seconds. End-of-scenario results are provided, at which time the student may select another scenario for further practice.

3. TRAINING OBJECTIVES:

a. Use the seeker.

(1) Adjust seeker video.

(a) Adjust brightness and contrast of video display.

(b) Select appropriate seeker iris diameter.

(c) State actions to take when seeker adjustment fails.

(2) Operate seeker slew to observe features.

(a) Maintain knowledge of orientation of seeker versus missile while seeker is slewed.

(b) Slew seeker to center target area on video display.

(c) State actions to take when seeker does not slew.

(3) Operate seeker zoom.

(a) State actions to take when seeker zoom fails.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-5.

5. TRAINING SUGGESTIONS:

The soldier should have completed ETC Lessons 1, 2, and 3. Chapter X, Using the Seeker, of the FOG-M system Operator's Manual (TM 9-1425-890-10) should have been read and understood.

Much of the skill involved in this lesson requires good eye-hand coordination. This takes time and lots of practice for most people; however, it is a skill that can be learned and is absolutely essential to becoming a FOG-M gunner. Further lessons require the skills developed here and can be practiced there also.

It is essential that the soldier understand the purpose and functions of the seeker in relation to the missile. Orientation of the seeker to missile flight path is a hard skill to develop and some soldiers require more practice than others to become proficient at this task.

Table B-5

Lesson 4, Using the Seeker -- Skills, Knowledge, and Conditions

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
USE SEEKER CORRECTLY				Demonstrate ability to use seeker to locate targets; know relationship between seeker direction and missile movement.
ADJUST SEEKER VIDEO	Given a FOG-M system and a variety of simulated seeker scenes.	Adjust seeker video to attain maximum image clarity and contrast.	Controls used to adjust seeker video, procedures for seeker video adjustment.	Adjust seeker video for maximum clarity and contrast.
ADJUST VIDEO DISPLAY BRIGHTNESS AND CONTRAST	Given a FOG-M system and simulated video display of seeker scenes.	Adjust video display as necessary for light conditions.	Location and operation of brightness and contrast controls, criteria for well adjusted video display for navigation and target discrimina- tion.	Adjust video display to compensate for prevailing conditions.
SELECT CORRECT SEEKER IRIS DIAMETER	Given a FOG-M system and a variety of simulated seeker scenes varying in brightness.	Rapidly adjust iris to maximize seeker contrast.	Location and operation or iris adjustment controls.	Adjust to compensate for available light conditions.

Table B-5

Lesson 4, Using the Seeker--Skills, Knowledge, and Conditions
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
STATE IMMEDIATE ACTION ON FAILURE OF IRIS ADJUSTMENT	Given a FOG-M system with a simulated iris adjustment malfunction, in various brightness conditions.		Procedures to compensate for iris adjustment failure.	List the various appropriate actions with no omissions.
OPERATE SEEKER SLEW TO OBSERVE TERRAIN AND OBJECT FEATURES	Given a FOG-M system with simulated cruise mode video.	Smooth operation of seeker slew control.	Procedure to slew seeker without altering missile flight, and maximize seeker video usability.	Operate seeker smoothly without disrupting missile flight, expert minimizes slew time.
MAINTAIN ORIENTATION OF MISSILE VS SEEKER WHEN SEEKER SLEWED	Given a FOG-M system, simulated cruise mode video, and seeker slewed away from forward.	Ability to discriminate seeker orientation versus missile orientation in 3-D.	Map reading, missile flight parameters, slewed seeker cues.	Indicate orientation of seeker vs. missile within 45 degrees at any orientation (25 degrees for expert).
SLEW SEEKER TO CENTER TARGET AREA ON VIDEO DISPLAY	Given a FOG-M system and simulated cruise mode video with multiple target areas.	Manually slew seeker to center target area, using joystick controls.	Procedure to select manual missile navigation, manual steering procedures, seeker slew procedures.	Center target in display within 5 seconds of appearance (less for expert).

Table B-5

Lesson 4, Using the Seeker -- Skills, Knowledge, and Conditions
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
STATE IMMEDIATE ACTION WHEN SEEKER WILL NOT SLEW	Given a FOG-M system with simulated cruise mode video and simulated seeker slew failure.	None	Procedure to compensate for loss of seeker control.	Correctly states all alternative actions possible. States probability of completing mission w/o seeker slew.
OPERATE SEEKER ZOOM	Given a FOG-M system, and simulated cruise video.	Operate zoom without loss of seeker and missile orientation.	Comprehension of orientation cues.	Zoom in and out appropriately, maintain orientation while zooming, expert never loses orientation.
STATE IMMEDIATE ACTION WHEN SEEKER ZOOM FAILS	Given a FOG-M system with simulated cruise video, and simulated seeker zoom failure.		Procedures to follow when zoom fails.	State correct alternatives in any order. State impact on mission success of failed seeker zoom.

2-7. LESSON 5 - Navigating the FOG-M

1. TRAINING TIME: 1 hour, 15 minutes
2. DESCRIPTION: This is a four part lesson.

Part A deals with relating the CGI map display to seeker video. It starts with an audiovisual presentation explaining CGI map generation, map symbology compared to real terrain features, real terrain features and man-made objects related to distance and aspect, and how to switch between seeker video and CGI map symbology.

It continues with a CGI map display with various man-made and natural features represented by standard military map symbology. The soldier is prompted to locate and mark, within 5 seconds, a specific symbol (e.g., pond, river, building, trail, etc.). An incorrect selection causes an immediate response and the soldier must choose again. If he selects another incorrect item, the system will show the correct item, record the error and continue. Upon completion, the soldier is provided feedback on: number of symbols marked correctly, number marked incorrectly, number of times he exceeded the time limit, and the number of symbols marked correctly a second time. The soldier is then presented an opportunity for further practice with different symbols on a different map or to continue with the lesson.

The next section is similar except the student must now use a real terrain picture to locate and mark prompted individual terrain/man-made features within 8 seconds per item and a total scenario time of 180 seconds. The same 10 symbols from the prior map lesson are used with immediate feedback for the first incorrect choice and highlighting of the correct item after a second incorrect choice. The same feedback is provided and an opportunity to continue the lesson or return to the section beginning for additional practice.

The next section requires the soldier to mark a prompted item from the presented CGI map, switch to the seeker video display, and mark that same feature on the seeker video display. Fifteen seconds are allocated to mark both map and seeker display. A second feature of this section is the reverse presentation of seeker video, switch to CGI map, and marking of that same feature on the map display. The system tells the soldier of an incorrect selection and highlights the correct item upon a second incorrect choice. The video is frozen at this point to allow study and correlation. Upon completion, feedback is provided along with retraining recommendations.

Part B involves controlling missile flight during cruise and consists of three sections.

The first section is an audiovisual presentation of automatic and manual missile navigation information.

During the second section, the soldier is given correct missile flight parameters on a preset course. With prompting, the soldier must, within 5 seconds, adjust to allowed tolerances for any deviation greater than 5 percent. Upon completion of predetermined missile flight time, the soldier should be in a target area where he must detect and mark specific targets. Immediate gunner feedback is provided as well as end of practice feedback. If the soldier's score is below standard, he is given the option to continue the lesson or return to start of this section for more practice.

In the third section, the soldier is given a target coordinate, seeker video, and CGI map symbology. He must manually navigate to, and mark, the correct target. Ten repetitions are provided with results feedback after each target selection.

Part C is the navigation performance test consisting of three sections.

In the first section, user test instructions and objectives are given. A flight scenario is then begun, during which the student must correct flight parameters to within required tolerances. The soldier is prompted to correct a deviation and is given 5 seconds to respond. If the student fails to respond, over or under corrects, he is again prompted and the error is recorded while the scenario continues. End of test feedback is provided about the number of errors and the total time required to return the missile to correct flight parameters.

The second section again has user test instructions and objectives. The soldier is instructed to navigate a missile to various features on a map and has complete missile control. He can switch between seeker video and map symbology. Flight parameters must be corrected and when the soldier has sight of the feature, he must locate and mark that feature with the cursor. Course deviation prompts are given and immediate response is given upon feature designation. There are 10 symbols to which he must navigate. If any errors occur, the soldier will be returned to the beginning of this section.

The third section again has user test instructions and objectives. The soldier is instructed to navigate a missile to a target area on a displayed map and has complete missile control. When in sight of the target area, it must be marked with the cursor. Course deviation prompts are given and end of section feedback is provided upon target area designation. Missile flight time is monitored and missile crashes are simulated with audible tones and a message explaining student error. Upon completion, the soldier is prompted to continue the lesson or return to the proper section to retrain on his errors.

Part D consists of two parts.

The first part is a narrative discussion and explanation of automatic navigation and correlator functions, as well as specific operational procedures.

The second part consists of eight practice performance scenarios that simulate several navigational problems (e.g., snow, desert, built-up areas, mountains, forest, water and correlator failure). End-of-flight map symbology feedback of optimum path, path actually flown and flight time is provided. Upon completion of all eight scenarios, student is prompted to continue or return to the beginning of this part for additional practice.

3. TRAINING OBJECTIVES:

a. Control missile flight.

(1) Use map display and relate to video.

(a) Switch between seeker video and map display.

(b) Identify corresponding landmarks on map display and seeker video.

b. Navigate missile.

(1) Verify initial cruise parameters.

(a) Observe missile parameters (pitch, roll, altitude, azimuth, flight path).

(b) Verify heading changes by observing key landmarks and switching to map display, adjust if necessary.

(2) Restore missile to course following an error in automatic or manual navigation.

(a) Determine required control inputs for course correction.

(3) Navigate with correlator.

(a) Verify that correlator is working properly during automatic cruise.

(b) Recognize that correlation has failed and cause of failure.

(c) State distinction between correlator failure and failure to achieve satisfactory index of correlation.

(d) Adjust path of problem missile to reinstate correlation when problem is low index of correlation.

(e) Navigate missile manually when correlator fails.

(4) Monitor video display to confirm that programmed heading changes are made (at waypoints).

(a) Return to correct course following waypoint check error.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-6.

5. TRAINING SUGGESTIONS:

The soldier should have completed ETC Lessons 1 through 4. Chapter X, Navigating the FOG-M, of the FOG-M Operator's Manual (TM 9-1425-890-10) should have been read and understood. A basic knowledge of military map reading and symbology is a prerequisite skill.

Additional training, on real terrain, in map reading related to ground features is highly recommended. The ability to read the CGI map and relate that to the seeker video display requires an ability to translate a map's two dimensions into a three dimensional mental picture. The seeker video display adds height, which is only represented on the map by contour lines.

If the student has problems marking targets, once in the target area, a return to Lesson 4, Using the Seeker, should improve his performance.

Table B-6

Lesson 5, Navigating the Missile - Skills, Knowledges and Standards

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
CONTROL MISSILE FLIGHT				Verify all parameters correctly. Correct any errors within 5 seconds.
USE MAP DISPLAY AND RELATE TO SEEKER VIDEO	Given a FOG-M gunner's console, simulated seeker video, and computer generated map displays.	Map reading.	Map reading, map symbology, relating map symbols to seeker video.	Relate map symbols to seeker video at 100% level.
SWITCH BETWEEN SEEKER VIDEO AND MAP DISPLAY	Given a FOG-M gunner's console with simulated seeker video and map displays.	None	Location of ALT DISP switch, procedure to switch between displays.	Perform procedure without error.
IDENTIFY RELATED LANDMARKS ON MAP DISPLAY AND SEEKER VIDEO	Given a FOG-M system with seeker images of given areas and correlated map displays of the same areas.	Map reading.	Change display function, identify key features on map and seeker video, map symbology, map interpretation.	Correlate landmarks between video display and map display on first viewing of a video scene at 75% accuracy. Expert=100%.
NAVIGATE MISSILE	Navigate missile to target area with minimal course deviations.			

Table B-6

Lesson 5, Navigating the Missile - Skills, Knowledges and Standards
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
VERIFY INITIAL CRUISE PARAMETERS	Given a FOG-M system and simulated cruise video.	Interpret video display and identify need for course corrections.	Acceptable missile attitude, altitude, and course. Location of missile parameter readouts.	Verify pitch, roll, initial altitude, and heading after missile reaches stable flight.
MONITOR MISSILE PARAMETERS DURING CRUISE	Given a FOG-M system and simulated cruise video.	Interpret video display and missile parameters to identify need for parameter corrections.	Acceptable ranges for missile altitude, attitude, and heading, location of missile parameter readouts.	Accurately identify missile pitch, roll, heading, and altitude throughout cruise. Determine and apply corrections.
VERIFY HEADING CHANGES BY OBSERVING SEEKER VIDEO LANDMARKS AND USING MAP DISPLAY AS REQUIRED	Given a FOG-M system with simulated cruise video, and landmarks to observe.	Interpret landmarks on seeker video, correlate with map display as required, perform course adjustments as necessary.	Procedures for displaying seeker video and map display, procedure for altering missile course using joystick.	Navigate to target area with minimal corrections of course and no loss of orientation, 100% of the time.
RESTORE MISSILE CRUISE PARAMETERS FOLLOWING AUTO OR MANUAL NAVIGATION ERROR	Given a FOG-M system with simulated cruise video, in manual control mode.	Identify and interpret navigation error and needed corrections to restore.	MAN NAV mode procedures, interpretation of missile parameter readouts.	Adjust course within +/- one degree of correct heading to target area. Expert= smooth.

Table B-6

Lesson 5, Navigating the Missile - Skills, Knowledges and Standards
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
DETERMINE REQUIRED CONTROL INPUTS FOR COURSE CORRECTION	Given a FOG-M system, simulated cruise video, and simulated missile straying from heading.	Interpret missile readouts and operate MAN NAV mode for missile steering.	Pitch, roll control location and function; missile readout inter- pretation.	Detect flight path deviation within 5 seconds of onset, correct within 5 seconds to +/- 1 degree.
NAVIGATE USING CORRELATOR				Correctly use correlator, detect correlator malfunctions and correct if possible. Manually navigate with malfunction- ing correlator.
VERIFY CORRELATOR OPERATION DURING AUTOMATIC CRUISE	Given a FOG-M system, simulated cruise video, and correlator function readout.	Ability to evaluate readout.	Location of readout for correlator failure.	Identify correlator failure or malfunction within 3 seconds of indication, 100% of the time.
RECOGNIZE CORRELATOR FAILURE AND CAUSE OF FAILURE	Given a FOG-M system with simulated correlator failure during cruise.	Ability to assess correlator failure.	Criteria to discriminate failure from inadequate data for correlator function.	Identify a correlator problem and distinguish failure from data problem in < 15 sec.

Table B-6

Lesson 5, Navigating the Missile - Skills, Knowledges and Standards
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
STATE THE CRITERIA TO DISTINGUISH BETWEEN CORRELATOR FAILURE AND DATA PROBLEMS	None	Ability to discriminate between correlator failure and inadequate data to achieve correlator function.	Criteria and acceptable range of index of similarity as used by correlator.	State criteria and range correctly, in any order.
ADJUST MISSILE TO REGAIN CORRELATION WHEN DATA DO NOT GIVE ENOUGH SIMILARITY FOR CORRELATOR FUNCTION	Given a FOG-M system with simulated seeker video, and a missile with a restorable correlation problem.	Change missile heading to proper heading to regain correlation.	Location of MAN/AUTO switch and slew switch on joystick. Location of ALT DISP and CHG MAP switches. Procedure for manual change of missile heading.	Restore correlation and automatic navigation within parameters within 30 seconds.
NAVIGATE MISSILE MANUALLY WHEN CORRELATOR FAILS	Given a FOG-M system, cruise video with correlator failure, and target location data.	Smooth operation of MAN NAV mode and navigation by visual contact references.	Operation of MAN NAV mode, navigation using seeker video and map display.	Navigate missile accurately to target area in MAN NAV mode.
MONITOR VIDEO TO CONFIRM HEADING CHANGES AT WAYPOINTS	Given a FOG-M system and simulated cruise video display.	Ability to interpret video and confirm heading changes correct.	Location of data, seeker video inter- pretation procedures.	Confirm or report no change for 100% of waypoint heading changes.

Table B-6

Lesson 5, Navigating the Missile - Skills, Knowledges and Standards
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
RESTORE CORRECT HEADING FOLLOWING WAYPOINT HEADING CHANGE FAILURE	Given a FOG-M system with simulated missile and seeker video, and a failed waypoint course change.	Correct missile heading to correct post waypoint heading.	Location of MAN/AUTO NAV control and slew control on joystick. Location of ALT DISP and CHG MAP controls. Procedures for manual heading corrections.	Restore correct heading within 30 seconds after planned waypoint heading change time

2-8. LESSON 6 - Target Detection and Selection

1. TRAINING TIME: 1 hour, 30 minutes

2. DESCRIPTION: This lesson consists of two main elements, target detection and target selection. Topics A, B, and C are concerned with target detection; topics D and E are concerned with target selection.

Topic A is composed of two parts. The first part is an audiovisual presentation of the principles of target discrimination, visual cues, and patterns.

The second part presents a sequence of targets during which the soldier has 10 seconds to locate and mark a target with the cursor. Failure within this time period provides a clue. Subsequent failure prompts the soldier to retry or continue. Two retry failures automatically recycles him to the next scenario. Upon completion of all targets, if the standard has not been met, the soldier is prompted to repeat the sequence or continue the lesson.

Topic B is an audiovisual presentation of a variety of natural and artificial camouflage materials and situations, and smoke/fog situations with an armored vehicle. No soldier interaction is required.

Topic C is a target detection performance test. Scenarios of missile flight to a point where a target area can first be detected are presented. The soldier must locate and mark the target area. The frame then freezes, at which time, the soldier must detect and mark specific targets within the target area. The soldier has 10 seconds to mark the target area from the time it enters seeker range. Failure causes a prompt and a subsequent failure causes automatic freeze-frame, highlighting of the target area, and error recording. The soldier must then detect and mark a series of cues and targets within 10 seconds each. Failure causes prompting and repeated failure causes highlighting and error recording. If the end-of-test score is below the standard, the soldier is prompted to redo this test or continue the lesson.

Topic D consists of three parts dealing with target selection. The first is an audiovisual presentation discussing enemy target priorities and discrimination items between enemy and friendly armored vehicles.

The second part is a series of seven 60 second scenarios. The soldier is briefed on a description of the target area, target of interest, and other enemy and friendly units believed to be in the target area. The scenario begins just before the target area and the soldier must locate the target area and mark the briefed target of interest. Immediate knowledge of results are given and if errors were

made, the soldier is prompted to retry the scenario or continue. Upon series completion, if score is below standard, the soldier is prompted to retry the series again or continue the lesson.

The third part is a series of four 60 second scenarios. The soldier is briefed on a description of the target area, target of interest, and other enemy and friendly units believed to be in the target area. The scenario begins just before the target area and the soldier must locate the target area and mark the briefed target of interest, discriminating from the friendly units in the area. Immediate knowledge of results are given and if errors were made, the soldier is prompted to retry the scenario or continue. Upon series completion, if score is below standard, the soldier is prompted to retry the series again or continue the lesson.

Topic E is the target selection performance test. A series of ten scenarios using a mix of enemy and friendly vehicles are presented. The soldier must detect, select, and mark the appropriate target on the body of the target within 15 seconds. Soldiers receiving a first try error may repeat the scenario but second try errors are recorded and automatically recycled to the next scenario. Upon completion of all 10 scenarios, if score is below standard, the soldier is prompted to continue the lesson or retry missed targets.

3. TRAINING OBJECTIVES:

a. Detect/select targets.

(1) Detect targets.

(a) Discriminate target from background video.

(A) Know visual cues that suggest that a visual pattern is a target.

(B) Change tracker contrast direction if selected target is brighter than background.

(b) Detect targets that are camouflaged.

(c) Detect targets in visual obscuration (smoke, vegetation, fog).

(2) Select targets.

(a) Zoom in on targets.

(b) Discriminate between briefed targets and other targets that may be present.

(c) Differentiate between high-priority and low-priority enemy targets.

(d) Differentiate between targets and friendlies.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-7.

5. TRAINING SUGGESTIONS:

The soldier should have completed ETC Lessons 1 through 5. Chapter X, Detecting and Selection of Targets, of the FOG-M Operator's Manual (TM 9-1425-890-10) should have been read and understood. A basic knowledge of enemy vehicle configurations and pattern recognition abilities is a prerequisite skill.

The ability to select threat targets from friendlies is a critical and essential skill that has a high decay rate. Therefore, frequent practice is mandatory in maintaining threat vehicle recognition skills. Check your Soldier's Manual and Trainer's Guide for other training resources pertaining to threat vehicle recognition and use them often in integrated training.

Detecting targets in camouflage and other masking conditions is a hard to learn skill. This skill requires very fine visual discrimination and while it can be learned, not everyone will learn at the same rate. Patience is required and coaching by someone more skilled to point out visual clues is suggested.

Table B-7

Lesson 6, Target Detection and Selection - Skills, Knowledges and Conditions

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
DETECT/SELECT TARGETS				Detect targets with 75-100% accuracy, select targets with 90-100% accuracy.
DETECT TARGET(S)	Given a FOG-M system with simulated cruise video, possibly with targets, also possibly with visual obscuration or target camouflage.	Ability to rapidly discriminate targets from other video imagery.	Visual cues indicating possible target presence.	Detect possible targets 100% of the time, within 3 seconds after appearance in video image. Expert reduces false alarms.
DISCRIMINATE TARGET AREA FROM BACKGROUND IMAGERY	Given a FOG-M system with simulated cruise video containing targets, which may or may not be camouflaged or visually obscured.	Discriminate foreground from background, under all conditions of visual obscuration and camouflage.	Features that discriminate foreground from background (edges, interposition, relative motion, gradients).	Discriminate target area 10% of the time. Expert reduces discrimination time and false alarms.
KNOW VISUAL CUES THAT SUGGEST TARGET PRESENCE	Given a FOG-M system, simulated seeker video with or without target-type cues.	Ability to discriminate camouflaged targets.	Depth cues.	Familiar with depth cues, able to discriminate camouflaged targets.

Table B-7

Lesson 6, Target Detection and Selection - Skills, Knowledges and Conditions (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
CHANGE TRACKER CONTRAST IF TARGET IS BRIGHTER THAN BACKGROUND	Given a FOG-M system with simulated cruise video containing a target that is brighter than the background.	Change contrast using appropriate controls.	Location of contrast controls.	Changes contrast in appropriate direction and magnitude 100% of time to compensate for target brightness.
DETECT CAMOUFLAGED TARGETS	Given a FOG-M system with simulated cruise video containing targets camouflaged in various ways.	Ability to detect targets under various forms of camouflage.	Visual cues indicating presence of camouflaged targets.	Correctly detect 75% of camouflaged targets in normal cruise. Expert performs at 100% level.
DETECT VISUALLY OBSCURED TARGETS	Given a FOG-M system and cruise video containing targets with various kinds of visual obscuration.	Ability to detect visually obscured targets.	Visual cues indicating target presence through obscuration.	Correctly detect 75% of obscured targets. Expert performs at 90% level.
SELECT TARGETS				Select a minimum of 90% of enemy targets and a maximum of 0% of friendly targets. Expert performs at the 100%/0% level.

Table B-7

Lesson 6, Target Detection and Selection - Skills, Knowledges and Conditions (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
ZOOM IN ON TARGETS	Given a FOG-M system with simulated cruise video (with or without obscuration) over multiple targets and non-targets throughout a cruise period.	Determine promising potential targets under all visual conditions and distractors. Center target area in seeker video. Discriminate targets from non-targets. Discriminate target priority.	Characteristics of promising target images.	Zoom in on target within 5 seconds of appearance on display (if not already zoomed on another target).
DISCRIMINATE BETWEEN BRIEFED TARGETS AND OTHER TARGETS PRESENT	Given a FOG-M system with simulated seeker video containing one briefed target and alternative possible targets, with or without obscuration.	Recognize briefed target at any aspect under any conditions of obscuration and target distractions.	Characteristics of targets and non-targets, type of targets briefed.	Select briefed target correctly 90% of the time. Expert performs at 100% level.
DISCRIMINATE BETWEEN HIGH AND LOW PRIORITY ENEMY TARGETS	Given a FOG-M system with simulated cruise video containing a mix of enemy targets.	Rapidly determine target priority.	Characteristics and identities of high and low priority targets.	Assign targets as high or low priority at the 90% correct level. Expert performs at 100% level.

Table B-7

Lesson 6, Target Detection and Selection - Skills, Knowledges and Conditions (Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
DISCRIMINATE FRIENDLY FROM ENEMY TARGETS	Given a FOG-M system with simulated cruise video containing a mix of friendly and enemy targets.	Discriminate friendly from enemy targets at any aspect, conditions of obscuration, or presence of target distractors.	Characteris- tics of friendly and enemy targets and rules for discriminat- ing between them.	Discriminate friendly targets from enemy targets 100% of the time.

2-9. LESSON 7 - Hitting the Target

1. TRAINING TIME: 45 minutes

2. DESCRIPTION: This lesson trains the soldier to lock on a target with the auto-lock feature, or hit a target using manual guidance techniques. It consists of Topic A and Topic B.

Topic A is composed of six parts. The first part is an audiovisual discussion of the terminal phase of missile flight and lock-on/break lock-on procedures.

The second part is a dynamic demonstration scenario in which the soldier observes the results of a lock-on, a break of lock-on, and failure to induce a timely break of lock-on procedure.

The third part has four scenarios consisting of still and moving geometric figures. The soldier must locate, track, and hold lock-on for 5 seconds per figure. At the end of each scenario, the soldier is provided a bar graph of his results. Upon completion of the final scenario, total results are given and the soldier is offered the opportunity to continue the lesson or go back for more practice.

The fourth part has a performance practice scenario containing five stationary enemy tanks. The position and aspect of each tank varies and the student must lock on to as many targets as possible within a 30 second time frame. Once lock-on is achieved, the system gives an audible noise, releases lock-on and removes the tank from the display. End-of-scenario feedback is given and the soldier has the opportunity to return for more practice or continue the lesson.

The fifth part contains eight scenarios with different numbers of enemy targets moving in different directions. This combination presents three levels of difficulty through which the soldier must progressively pass. Immediate and end-of-difficulty level feedback is provided. The soldier is prompted for more practice if below standard, or to continue the lesson.

The sixth part consists of a series of three scenarios with moving truck-towed artillery pieces and a suddenly appearing high-priority tank. The soldier must lock-on the truck, detect the tank, and break truck lock-on to lock-on the tank. The soldier must achieve truck lock-on within 10 seconds and tank lock-on within 10 seconds of appearance. Automatic repeat is accomplished if the soldier fails both of these requirements. End-of-scenario results are provided with an opportunity for more practice or to continue the lesson.

Topic B is the performance test. This test has dynamic simulation performance scenarios containing moving (different angles), stationary, camouflaged, high and low-priority targets, presented under different observation conditions. The missile seeker video has target

area in sight and soldier must detect, lock-on, reject and lock-on, specific targets within 10 seconds according to scenario requirements. The soldier is scored according to category of target. If score is below standard for any category, he is prompted to return to the proper part of Topic A for more training, or continue to the next lesson.

3. TRAINING OBJECTIVES:

a. Lock missile on selected target.

(1) Slew crosshairs on to target and maintain them on target.

(2) Perform and verify target lock-on.

(3) Recognize failure of missile to lock on to selected target.

b. Break target lock-on.

(1) State reasons to break target lock-on.

(2) State procedure to break target lock-on.

(3) Switch autotracker from one target to a more desirable target if time permits.

(a) Determine that an alternative target is worth breaking lock-on to switch autotracker.

(b) Break lock-on and switch to unguided cruise if target is identified as non-target.

c. Steer missile into target manually.

(1) Manually guide missile to stationary target, in case of autotracker or correlator failure.

(2) Manually guide missile to moving target, in case of autotracker or correlator failure.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-8.

5. TRAINING SUGGESTIONS:

The soldier must have successfully completed ETC Lessons 1 through 6. Chapter X, Hitting the Target, of the FOG-M Operator's Manual (TM 9-1425-890-10) should have been read and understood.

Refresher training of fine motor, visual perception, and engagement rules are important to meeting and sustaining combat ready

FOG-M gunner skills and require frequent practice to maintain proficiency. Practice is the operant word for this lesson. Practice and more practice until you can hit the correct target each and every time.

Table B-8

Lesson 7, Hitting the Target - Skills, Knowledges and Conditions

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
LOCK MISSILE ON SELECTED TARGET				Lock-on or guide missile to target with average 95% probability of target kill. Expert approaches 100%.
SLEW CROSS- HAIRS ONTO TARGET AND MAINTAIN THEM ON TARGET	Given a FOG-M system, simulated cruise video containing a single target, with or without visual obscuration.	Target tracking, performing under visually obscured conditions without losing target tracking.	Procedure to slew and maintain crosshairs on target.	Maintain crosshairs on target for 15 out of 20 seconds, counted from first target centering. Expert maintains 100% track.
PERFORM AND VERIFY TARGET LOCK-ON	Given a FOG-M system with simulated video, and a target centered in crosshairs.	Target tracking.	Missile behavior when locked on versus not locked on to a target.	Lock-on correctly 100% of the time. Identify when a lock-on has failed due to missile behavior.
RECOGNIZE FAILURE OF MISSILE TO LOCK ONTO TARGET	Given a FOG-M system and simulated video from missile in terminal phase and failure to lock-on.	Ability to recognize lock-on failure.	Missile behavior when locked on versus not locked on target.	Recognize missile lock- on failure within 3 seconds, 100% of the time.

Table B-8

Lesson 7, Hitting the Target--Skills, Knowledges and Conditions
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
BREAK TARGET LOCK-ON	Given a FOG-M system, simulated video of a target locked on be seeker, and missile closing on target.	Ability to discriminate non-target or wrong point of aim of locked-on missile.	Reasons and procedures to break target lock-on.	Break lock-on within 3 seconds of recognizing wrong point of aim or non-target, at 100% level.
STATE REASONS TO BREAK TARGET LOCK-ON	None	None	Reasons to break target lock-on.	State all reasons correctly in any order.
STATE PROCEDURE TO BREAK TARGET LOCK-ON	None	None	Procedure to break target lock-on.	State procedure steps in correct order with no omissions.
SWITCH AUTO- TRACKER FROM ONE TARGET TO ANOTHER, IF TIME PERMITS	Given a FOG-M system with simulated terminal phase video, a locked-on target, and one or more higher-priority targets in view.	Break lock using joystick trigger, lock onto new target.	Procedure for breaking auto-track lock, manual flight control procedures, procedure for lock-on, location of appropriate controls.	Switch targets to a higher priority target 80% of the time; hit some target (higher or same priority) 90% of the time.

Table B-8

Lesson 7, Hitting the Target - Skills, Knowledges and Conditions
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
REPRIORITIZE TARGETS IN TERMINAL PHASE	Given a FOG-M system with terminal phase video and alternate targets of different priorities in view, auto-track locked on one target.	Target priority assessment, assess time available, break lock, center new target, lock-on.	Target priorities and assessment, break lock and lock-on procedures.	Correctly decide to change targets 80% of the time, beginning with video at impact minus 10 seconds.
BREAK LOCK-ON AND SWITCH TO UNGUIDED CRUISE ON IDENTIFICATION OF LOCKED-ON TARGET AS NON- TARGET	Given a FOG-M system with terminal phase video and a locked on target that is actually a non-target.	Break auto-track, use joystick controls, manually fly missile to alternate target or into ground.	Target versus non-target characteristics in terminal phase video, procedure to select MAN NAV, procedure to break lock, manual steering.	Correctly identify non-target and avoid 100% of the time, within 5 seconds; expert scores 50% hits on alternate targets.
STEER MISSILE INTO TARGET MANUALLY ON AUTO-TRACK OR CORRELATOR FAILURE	Given a FOG-M system with terminal phase video and a locked on target (moving or stationary), and failure of correlator or autotracker.	Manual missile control.	Symptoms of failures, manual missile control, MAN NAV switching procedure, target location, target lead procedures.	Assume manual control and hit moving target 90% of the time (100% for stationary target).

2-10. LESSON 8 - Missile Impact Assessment

1. TRAINING TIME: 15 minutes

2. DESCRIPTION: This is a two part lesson. The first part is an audiovisual presentation discussing impact assessment methodologies and operation of the videocassette recorder (VCR).

In the second part, a series of simulated missile engagements are presented. The soldier must record the presentation, and after missile impact, respond to a damage assessment question. He is then put in control of a reconnaissance missile in the same target area and locates the same target, recording the seeker video. If his prior assessment was incorrect, he must lock-on and try to hit the target again or search for other targets if the original target was destroyed. The soldier must then replay the video and respond to the target's destruction.

3. TRAINING OBJECTIVES:

a. Operate videocassette recorder.

(1) Record seeker video from missile.

(2) Demonstrate ability to operate videocassette recorder in playback mode.

b. View the recorded seeker video and assess target damage.

(1) State methods for assessing target damage.

(A) State evidence for target damage.

(2) Review videotape of the terminal phase and impact of the subject missile.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Table B-9.

5. TRAINING SUGGESTIONS:

The soldier must have successfully completed ETC Lessons 1 through 7. Chapter X, Missile Impact Assessment, of the FOG-M Operator's Manual (TM 9-1425-890-10) should have been read and understood.

Frequent review of damage assessment methodologies for prior missile flights should be conducted. These reviews can be held in a group setting for maximum exposure or on an individual basis at any local learning center having the appropriate audiovisual equipment.

Table B-9

Lesson 8, Missile Impact Assessment - Skills, Knowledges and Conditions

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
OPERATE VCR				Operate VCR to record and playback seeker video without error.
RECORD SEEKER VIDEO FROM MISSILE	Given a FOG-M system, VCR, and simulated seeker video.	Load VCR tape, operate VCR to record.	Procedure to load tape; procedure to record using VCR.	Load tape and operate recorded without error.
PLAYBACK RECORDED VCR IMAGES	Given a FOG-M system, a VCR, and a recorded tape.	Operate VCR to playback images.	Procedures to play back tape on VCR.	Operate playback without error.
VIEW RECORDED SEEKER VIDEO AND ASSESS TARGET DAMAGE	Given a FOG-M system, and one playback of a recorded target impact by missile from VCR.	Real-time determination of impact's effect on target.	Target vulnerable points and effectiveness of missile warhead at each.	Correctly judge target disabled or non-disabled 75% of the time; expert assesses correctly at 90% level.
STATE METHODS FOR ASSESSING TARGET DAMAGE	None	None	Methods	State all methods without omission.
STATE EVIDENCE OF TARGET DAMAGE	None	None	Threat vehicle and equipment vulnerabilities, missile AoA/AoD.	State correctly 100% of the time.

Table B-9

Lesson 8, Missile Impact Assessment - Skills, Knowledges and Conditions
(Continued)

TRAINING OBJECTIVES	CONDITIONS	SKILLS	KNOWLEDGES	STANDARDS
ASSESS KILL PROBABILITY FOLLOWING TARGET IMPACT	Given a FOG-M system and videotape of terminal phase through target impact with multiple types of threat vehicles and equipment and multiple missile impact aspects on each.	Ability to assess kill or damage probability accurately.	Methods for assessing target damage, evidence of target damage, operation of VCR.	Accurately predict kill or damage 90% of the time. Expert predicts at 95% level.

2-11. LESSON 9 - Full Mission Scenario

1. TRAINING TIME: 30 minutes

2. DESCRIPTION: The student or instructor may select several mission parameters (pre-planned, azimuth, coordinates, target obscuration, level of obscuration, and flight deviations) prior to beginning the simulation. The system provides the soldier with all required information and prompts him to begin the mission.

This is a three stage scenario: (1) Launch, (2) Cruise to impact, (3) Impact assessment. No prompting is received during the scenario; however, error messages are given. The soldier may choose to repeat any failed stage of the scenario before continuing to the next stage. It is possible to crash the missile if parameters are not maintained. When target area is visible, the soldier must detect, select, and lock-on a target within 20 seconds. Video of the impact may be recorded, but an impact assessment must be made within 60 seconds. If target was destroyed, the mission ends. If target was missed, or only damaged, another missile must be selected (new launch or missile in flight) within 60 seconds of the first strike. Upon mission completion, feedback is provided and student may choose to retrain on any portions failed or select another mission.

3. TRAINING OBJECTIVES:

All objectives from Lesson 3 through Lesson 8.

4. CONDITIONS, SKILLS, KNOWLEDGES AND STANDARDS: See Tables B-2 through B-9.

5. TRAINING SUGGESTIONS:

The soldier must have successfully completed ETC Lessons 1 through 8. Since the full mission scenario utilizes the skills and knowledges gained from all the other lessons, in sequence, a weakness in one of the lesson skills will demonstrate itself in the full mission.

In this way, a soldier's weaknesses may be diagnosed and appropriate sustainment training methods applied. These methods may not, nor should they always, be use of the FOG-M Embedded Training Component. A lack of familiarity with map symbology may require the soldier to take sustainment training in Military Map Reading at the local MOS learning center or through military correspondence course. Confusion over enemy versus friendly vehicles requires training using the media designed specifically for that purpose. The Trainer's Guide offers a wide selection of other training media to use in overcoming individual weaknesses.

Any weaknesses demonstrated in the full mission scenario must be, where appropriate, addressed by retraining and practice in the appropriate lesson. For example, an inability to detect a target under camouflage indicates a weakness in detecting targets, and the soldier should be required to retake ETC Lesson 6, Target Detection and Selection. A problem in following proper launch procedures indicates a weakness in that area and the soldier should be required to retrain on ETC Lesson 3, Launch.

CHAPTER 2

SECTION III. OPERATION UNDER UNUSUAL CONDITIONS

2-12. NIGHT OPERATIONS

The FOG-M system is not presently capable of night operations; therefore, system training for night operations is not available. This capability is planned for future system improvements and training capabilities for night operations will be available at that time. However, the FOG-M section does require training in individual and collective tasks not related to the FOG-M system.

2-13. DESERT OPERATIONS

Training for desert operations with the FOG-M system requires extensive familiarity with the Vehicle Navigation Aids System (VNAS) for system movement and the digital map display for missile navigation. Few landmarks are available in the desert for visual navigation and heavy reliance on instrument displays can be expected. Target detection is particularly difficult due to heat wave distortion. Frequent practice is required to sustain and improve these associated skills.

2-14. COLD WEATHER OPERATIONS

Training for cold weather operations presents similar skill and knowledge demands as desert operations. Few detailed landmarks will be available, and possibly few large landmarks, requiring dependence on the VNAS and the digital map display for ground and missile navigation. Distance visibility may be limited and bright sunshine will strongly affect seeker operations. Camouflage possibilities are greater and will present an increased requirement for target detection skills and knowledge.

2-15. MOUNTAIN OPERATIONS

FOG-M system deployment in mountainous terrain will present increased demands on the gunner's mission planning, navigation, and manual missile flight skills and knowledge. Decreased target ranges, due to terrain configuration, will require faster gunner response times. The task associated skills and knowledges must be trained often to insure gunner proficiency in mountain operations.

2-16. JUNGLE OPERATIONS

Jungle operations present their own unique set of gunner training requirements. Jungle canopies often present great difficulty in target detection. Several passes over the reported target area may be

required to detect enemy targets in a jungle environment. This would require proficiency in manual missile navigation and maneuvering.

2-17. URBAN OPERATIONS

Due to system characteristics, use of the FOG-M system for urban operations is not likely. However, it is potentially useful, over distance, in urban terrain. Gunner skills in mission planning, manual navigation and maneuvering, again play an essential role in assuring accurate delivery of the missile. Varying building heights, compactness of the terrain, and air turbulence present a variety of situations that will place increased demands on gunner proficiency. As in mountain operations training, task associated skills and knowledge must be trained frequently.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

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CHAPTER 3

MAINTENANCE INSTRUCTIONS

SECTION I. TROUBLESHOOTING PROCEDURES

3-1. VIDEODISC

Videodiscs accompanying the ETC are hard plastic coated discs similar to a phonograph record. Where a phonograph records grooves may become damaged, the surface of a videodisc is covered with hard plastic that is difficult to damage. Even if damaged, only that portion of the disc will be unusable; the remaining portions of the disc will be available for training. Replacement discs are available from the proponent school's Non-Resident Instruction Branch.

3-2. DIGITAL MAP GENERATOR (DMG) TAPE

DMG cassette tapes are subject to physical as well as electronic damage. They are no different than any other magnetic tape cassette and must be protected from dirt, water and physical damage. Data destruction will be caused primarily by placing the tapes too close to a strong magnetic field. Keep DMG tapes away from electrical power sources, the Gunner's Console monitor screen, and other possible sources of strong magnetic fields.

If the DMG tape fails to load, check the cassette for physical damage and the DMG slot for obstructions. If a data error message is received after trying to load the DMG tape, check the tape for physical damage (cracks, wrinkles, etc.). Do not attempt to repair these cassettes, but obtain an immediate replacement from your supervisor.

SECTION II. MAINTENANCE PROCEDURES

3-3. ETC operator maintenance procedures are indicated in the FOG-M system Operator's Manual (TM 9-1425-890-10).